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Abstract

Do citizens view state and traditional authorities as substitutes or complements? Past work has been divided on this question. Some scholars point to competition between attitudes toward these entities, suggesting substitution, whereas others highlight positive correlations, suggesting complementarity. Addressing this question, however, is difficult, as it requires assessing the effects of exogenous changes in the latent *valuation* of one authority on an individual's *support* for another. We show that this quantity—a type of elasticity—cannot be inferred from correlations between support for the two forms of authority. We employ a structural model to estimate this elasticity of substitution using data from 816 villages in the Democratic Republic of Congo and plausibly exogenous rainfall and conflict shocks. Despite *prima facie* evidence for substitution logics, our model's outcomes are consistent with complementarity; positive changes

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in citizen valuation of the chief appear to translate into positive changes in support for the government.

Keywords

social contract, central authority, traditional authority, Congo

Introduction

Standard descriptions of the development process envision a gradual shift in power away from traditional authorities toward centralized state structures.¹ Traditional and modern societies are often described as end points of this process. In practice, however, in many developing countries, traditional authorities and central states coexist and often enjoy influence over overlapping domains, including property rights over land (Fergusson, 2013; Goldstein & Udry, 2008) and legal regimes (Aldashev, Chaara, Platteau, & Wahhaj, 2012). This institutional plurality gives citizens opportunities for institutional forum shopping and creates confusion among development actors who are confronted by complex choices of whether to partner with formal structures, traditional authorities, neither, or both. Moreover, although development accounts describe this plurality as a transitional state, it is possible that shared authority represents a steady-state outcome of power in some contexts.

The overlapping of jurisdictions between traditional structures and “modern,” Westphalian state authorities, and the possible shifting of support between them, gives rise to an important question: Do citizens consider traditional leaders and states as substitutes or complements? That is, does an increase in citizen valuation of the chief decrease or increase her support for the state, and vice versa? Answering this question has implications for understanding development processes and the potential success of development interventions. In recent years, for example, programs that introduce community-level institutional innovations have become popular, with the intention to constrain traditional leadership and empower local populations. These programs are undertaken across the world: for example, Liberia (Fearon, Humphreys, & Weinstein, 2009), Afghanistan (Beath et al., 2013), Sierra Leone (Casey, Glennerster, & Miguel, 2012), Sudan (Avdeenko & Gilligan, 2015), and Congo (Humphreys, Sanchez de la Sierra, & van der Windt, 2018). Mansuri and Rao (2013) quote a figure of US\$85 billion in World Bank spending in the past decade alone on these types of interventions. Insofar that these interventions decrease citizen valuation of traditional leaders, it is important to understand whether they translate into

changes in citizen support levels for the state. In this article, we present a careful discussion about how to understand whether traditional and state authorities are substitutes or complements with respect to citizen connections, loyalties, and commitments.

The existing literature on this topic is mixed. Until recently, the bulk of the literature portrays the relationship between states and traditional leaders as zero-sum: for example, gains in terms of governing power and legitimacy for the state imply a loss for traditional leaders (Keulder, 1998; Oomen, 2000). More recent scholarship, by contrast, has suggested complementarities between state and traditional authorities in terms of both governance and moral authority (Baldwin, 2013, 2016; Logan, 2009; see Holzinger, Kern, & Kromrey, 2016, for a review). Other characterizations fall in between. Englebert's (2002) nuanced case study of Uganda, for example, suggests that the revival of the kingdom of Buganda may have translated into more symbolic than material benefits for citizens, as the kingdom could neither completely substitute for nor complement state institutions.

These competing claims rest on a mixture of evidence, including quantitative and qualitative analyses. Past quantitative work exploring this question has focused on whether support for the state and traditional authorities is positively or negatively correlated. At first blush, this method appears like a reasonable empirical strategy. However, it lacks a clearly defined estimand. Learning about the correlation between levels of support for, and connections to, traditional leaders and the state is not the same as learning about substitution or complementarity between them. (For intuition, boots and shoes may be substitutes, but individual wealth might produce a positive correlation between ownership of the two types of footwear). In fact, as we will see below, even if these authorities are complements, it is possible that support for each is negatively correlated. In this study, we treat the estimand as a structural parameter: the *elasticity of substitution* between the support for traditional and state authorities. Intuitively, this value captures the extent to which the *support* for one authority rises or falls when the underlying *valuation* of the other changes. This elasticity parameter cannot be estimated using simple correlations. The parameter can, however, be estimated with a structural model that uses observable data to impute relationships between unobserved constructs (latent variables; e.g., Kline, 2015). In this article, we present such a structural model, and estimate it with original survey data about citizen support for traditional and central authorities, using data from 816 villages in the Democratic Republic of Congo (DRC). We exploit plausibly exogenous shocks in the form of abnormal rainfall and exposure to conflict to generate variation in valuations for these authorities.

Our analysis points to a nuanced account. Consistent with past arguments that highlight tensions between traditional and state institutions, we find that citizens who are more likely to support the state are less likely to support traditional authorities, and vice versa. This negative correlation might be taken as *prima facie* evidence for rivalry and the logic of substitution. Results from our structural model, however, question this inference. When we estimate the elasticity of substitution, we find evidence for complementarity: we find suggestive evidence that an increase in the valuation of the state increases the support for the chief. This study thus makes a contribution both by assessing whether or not civilian support of state and traditional authority are substitutes or complements and by developing a strategy on how researchers can go about answering this important question more broadly.

The remainder of this article is organized as follows. Section “Conceptualizing Complementarities in Support for Alternative Authorities” describes our conceptualization of the complementarities between state and traditional authority in the eyes of civilians. Section “Research Site: Governance in the DRC” anchors the study in the Congolese context. Sections “Data” and “Empirical Strategy” detail the data and empirical strategy. Section “Results” presents our results. Section “Conclusion” concludes.

Conceptualizing Complementarities in Support for Alternative Authorities

We are interested in understanding citizen perceptions and behaviors with respect to their obligations and rights vis-à-vis authorities (state or traditional) and their perceptions of the validity of claims made by authorities on them, commonly described as social contracts (Keele, 2007; Levi, 1988; Organisation for Economic Co-operation and Development [OECD], 2008; Timmons, 2005).² We are interested in the variance in these social contracts, as they can reflect and affect the quality of governance (Luttmer & Singhal, 2014; OECD, 2008). With stronger social contracts, citizens delegate more power and authority to officials, comply more intensely with laws and regulations, and monitor officials through various means, including increased political participation. Theoretically, the combination of enhanced authority and accountability can yield a virtuous cycle in which authorities perform better and citizens achieve higher development outcomes. With weaker social contracts, the reverse is true, such that polities can become stuck in an equilibrium of low delegation, low compliance, and low performance, ultimately undermining development (Bidner & Francois, 2013).

The core interest of this article is in understanding how these contracts relate to each other. That states substitute for traditional authorities is a very old idea in the modernization literature (Lerner, 1958). In practice, in many developing countries, notably in Africa, traditional authorities and central states coexist and often share influence over overlapping domains, which gives rise to multiple social contracts in the same territorial space. As Lund (2006) points out, “much of the literature on African politics and its history details how governmental and chieftaincy institutions negotiate, forge alliance and compete to constitute public authority and political control” (p. 686). In some of these accounts, logics of substitution appear to be at play. For example, Bodea and LeBas (2016) highlight how community-provided goods and state-provided goods may substitute for each other; when communities function more effectively, citizens are less inclined to pay taxes to central authorities. Other work, in contrast, sees evidence for complementarity. Using Afro-Barometer survey data, for example, Logan (2009) shows a positive correlation between citizen trust in state officials (e.g., local elected counselors and the president) and traditional authorities. She also finds positive correlations between people’s support for democracy, their general level of trust in other citizens, and trust in (generally unelected) traditional leaders. She argues that Africans view “chiefs and elected officials as common players in a single integrated political system, rather than as opponents in a sharply bifurcated one. Thus, positive perceptions of chiefs go hand-in-hand with positive assessments of elected leaders, and vice versa” (Logan, 2009, p. 103).³

However, neither negative nor positive correlations, in and of themselves, are sufficient to make reliable inferences about whether citizens view state and traditional authorities as substitutes or complements.⁴ Making inferences about substitution or complementarity requires a broader framework that can capture the logic relating the support for one authority to the support for another authority.

A simple model can help clarify the concepts of complementarity and substitution and show how the degree of complementarity does not directly map to the sign of observable correlations. Consider a situation in which citizen support for each type of authority is a function of external events, given some underlying valuations of each type of authority. Say that citizen support for traditional authorities and government (s_c , s_g) depends on their latent valuations (v_c , v_g) of each of these according to

$$E(s_c) = \frac{v_c^\sigma}{v_g^{\sigma-1} + v_c^{\sigma-1}},$$

$$E(s_g) = \frac{v_g^\sigma}{v_g^{\sigma-1} + v_c^{\sigma-1}}.$$

The parameter $\sigma \geq 0$ captures the (constant) elasticity of substitution (CES): values $\sigma > 1$ correspond to greater substitution between traditional and modern authorities, while values $\sigma < 1$ correspond to greater complementarity between them.⁵

A key feature of this elasticity is that the responsiveness of support for one authority to the valuation of the other depends on σ . To see this, note that

$$\frac{\partial E(s_c)}{\partial v_g} = -(\sigma - 1)v_g^{\sigma-2} \frac{v_c^\sigma}{(v_g^{\sigma-1} + v_c^{\sigma-1})^2},$$

which is positive when $\sigma < 1$, negative when $\sigma > 1$, and equal to zero when $\sigma = 1$.

The role of σ is most clearly illustrated using the example about boots and shoes that we used in the introduction, which corresponds to a simple consumer model with two products. The v terms can be thought of as inverse prices (“bang for your buck”) and the s terms as demand. If the price of boots increases, the direct effect (what we will call the *within effect* in section “Results”) is that the demand for boots decreases. Furthermore, if boots and shoes are substitutes ($\sigma > 1$), there will be an indirect effect (what we will call the *across effect* in section “Results”) as well: The demand for shoes will increase. On the contrary, if boots and shoes are complements ($\sigma < 1$), the demand for shoes will also decrease.⁶

Thus, negative or positive correlations between v_g and v_c do not provide evidence of complementarity or substitution. Ceteris paribus, a shock to v_g or v_c induces common or opposite movements in v_g and v_c depending on σ . However, this correlational evidence is not dispositive because positive or negative correlations can be consistent with any value of σ . If both v_g and v_c were to increase by factor λ , for example, both s_g and s_c would also increase by factor λ , *no matter the value of σ* .⁷ Thus, even if boots and shoes are substitutes, a positive correlation may be obtained: for example, richer citizens may buy more of both yet still buy less of one when the price of the other goes down.

Correlations in support for authorities are thus conceptually distinct from the question of substitution and complementarity. Correlations tell us whether support for traditional leaders and the state move together. However, if we want to understand whether traditional authorities and central authorities are substitutes or complements in the minds of citizens, we need to try to estimate elasticities, which is the key focus of the remainder of this article.

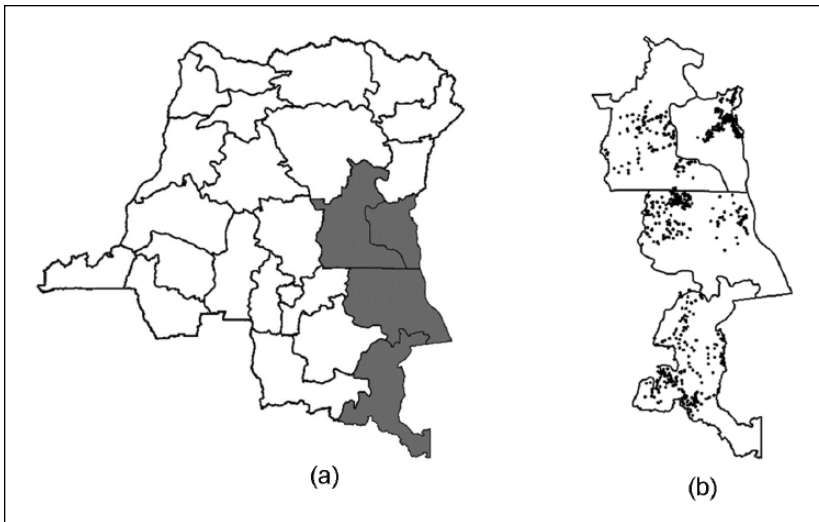


Figure 1. Map of the research area: (a) DRC and (b) study villages.

Note. Authors' drawing. (a) The provinces (from north to south) of Maniema, South Kivu, Tanganyika, and Haut Katanga are highlighted. (b) Villages included in the study. DRC = Democratic Republic of Congo.

Research Site: Governance in the DRC

Present-day Congo is a paradigmatic case of state weakness and overlapping authority. During the colonial period, the country was exploited by Belgian colonizers for ivory and rubber. They left behind a parasitic state with limited governance capacity, reach, and infrastructure. Following independence in 1960, Mobutu Sese Seko consolidated power and ran the country as a kleptocracy, perpetuating the frailty of state institutions and functionality (Turner & Young, 1985). "Liberation" from the Mobutu regime led to a period of renewed armed conflict and the collapse of the central administrative apparatus. Our area of study—the provinces of South Kivu, Maniema, Tanganyika, and Haut Katanga—figured centrally in the violence that has engulfed the country over the past two decades. Located in Eastern Congo (Figure 1), our study area was home to the Congolese Wars (1996-1997 and 1998-2003). The last war directly involved eight African nations and over 25 armed groups and was the deadliest war in modern African history. Despite the formal end to the war in July 2003, much of our research area continues to experience episodic spikes in conflict.⁸

Citizens in the DRC are not just affected by episodic violence. They must also deal with natural disasters and the vagaries of weather. Less than 4% of the total agricultural land in Africa is irrigated (You et al., 2011) and most communities have no access to formal insurance and credit markets (Nin-Pratt et al., 2011). Rainfall is, thus, a key determinant of crop yields. Subsistence farmers in the DRC are especially vulnerable to weather shocks. Too little rain shortens the growing season, preventing some crops from completing their natural growth cycle, while too much rain results in flooding and landslides, destroying crops and assets (Nin-Pratt et al., 2011).

Congo ranks at the bottom of the Brookings Institute's Index of State Weakness (Rice & Patrick, 2008) and is the third most fragile state according to the Fund for Peace's 2015 Fragile State Index. The Congolese state's short reach and shallow density are reflected at the local level in Eastern DRC (World Bank, 2011). According to the data we report on below, for example, only 26% of people in our sample correctly know the name of the country's ruling party, 32% know the name of their member of parliament, and only 17% know the name of the prime minister.⁹ Similarly, only 8% of chiefs claim that their village was visited by national or provincial government officials in the prior month. While such evidence may not be surprising for scholars studying Congo, it suggests that the social contract between citizens and the state is relatively weak.

The Congolese government aims to strengthen its governing capacity and ties to citizens (World Bank, 2008). The new 2006 constitution called for considerable decentralization; among other things, it transferred powers over the delivery of basic public services to provinces and new so-called "Decentralized Territorial Entities," or "ETDs" following their French acronym. Decentralization of districts would potentially increase political accountability and allocative efficiency, as local preferences would be weighed more heavily (Alesina & Spolaore, 2003). To date, however, the decentralization project has stalled. The ETDs, for example, have proven ineffective at "providing public goods and services to their populations" (World Bank, 2011, p. 44), partly because of internal management deficiencies, including the inability to produce and implement budgets.

For many citizens in Eastern Congo, the village is the primary arena of social, political, and economic interaction. The Congolese in our study area are subsistence farmers in small villages, averaging only 137 households per village. The villages are also isolated. For example, 6% of respondents do not know the location of the nearest public transport. Respondents who do know the location of the nearest transport claim that the average facility is about 4.5 hours away on foot. It is thus not surprising that 90% of respondents had not

read a newspaper in the month prior to the survey, 75% had not listened to the radio, and 26% had no phone.

Surprisingly, perhaps, neither the virtual absence of the Congolese state in practical terms nor the isolation of the villages in general terms means that the social contract between Congolese citizens and the state is completely absent at the conceptual level. As De Herdt, Titeca, and Wagemakers (2012) show in their examination of the education sector, the concept of the state and the concept of social contracts with the state remain quite important in many places.

In villages in Eastern Congo, public service provision is largely a local affair in which nonstate actors play a nontrivial role (Seay, 2013; Titeca & De Herdt, 2011). Central to these governance actors is the village chief, who bears responsibility for everything pertaining to the village, including the implementation of development projects.¹⁰ This claim is corroborated by data from our household survey. As shown in Table A1 in the supplemental appendix, which presents descriptive statistics on activities undertaken by the chief during the month prior to the survey, village chiefs are largely responsible for land allocation, interaction with actors from outside the village, dispute resolution, public goods provision, and handling of other issues related to the community. According to our survey, which asked about all public goods projects undertaken in the village in the 6 months before the survey, communities initiated over 68% of these projects, nongovernmental organizations (NGOs) account for 12%, and the state (adding up all levels of government), by contrast, only accounted for 2% of the projects. The survey also asked individuals which governance actor was the most important in selecting beneficiaries in the hypothetical situation that outside funds would arrive in the village. The majority of individuals responded that it is the chief.¹¹ Chiefs thus play the role of development brokers within the village in Eastern Congo (in line with Baldwin, 2016).

In sum, answering whether traditional leadership and the central state are considered substitutes or complements in the mind of citizens is particularly pertinent in Congo.

Data

We draw data on attitudes toward the state and traditional institutions from a large survey that took place between December 22, 2010, and January 18, 2012, targeting 1,120 villages in the Congolese provinces of South Kivu, Maniema, Haut Katanga, and Tanganyika (Figure 1).¹² In all villages, one randomly selected adult from each of five randomly selected households was interviewed. The survey asked information about the household and its

members and included a set of questions designed to learn about the social contract between citizens vis-à-vis the central state and traditional leaders. In addition, interviews were conducted with the village chief. All instruments and protocols are publicly available online.¹³ In total, the household survey collected information from 3,881 households from 816 villages.¹⁴

Measuring the State Contract

Respondents were asked a number of questions about the ties between citizens and state authorities, what we will call the state contract. We group these questions into four families, tapping into what we view as different conceptual dimensions of the social contract: responsibilities of the state to citizens, responsibilities of citizens to the state, the value citizen's report for state activities, and recent citizen actions vis-à-vis the state apparatus. For the analysis, we also group the variables in one overall state contract variable. Table 1 presents descriptive statistics of both individual measures and mean values at the family level. All individual measures are dummies and constructed so that an increase indicates a strengthening of the state contract. Table A2 in the supplemental appendix presents the exact question wording for all variables used in this study.

Responsibilities of the state. The survey asked respondents to list what, in their opinion, are the responsibilities of the state in their relations with citizens. Enumerators recorded (yes/no) whether the responses fell in the following categories: (a) accepting the results of national elections, (b) reacting to citizen complaints, (c) reacting to citizen suggestions, (d) avoiding corruption, (e) keeping the population informed about government actions, (f) consulting the population when making decisions, and (g) contributing resources (money and labor) to aid with community projects. Table 1 shows that the state contract is relatively weak. Only two categories—react to complaints and contribute resources to community projects—are mentioned by more than half of respondents.

Responsibilities of citizens. The next outcome explores the other side of the social contract: the responsibilities of citizens toward the state. Specifically, respondents were asked what they considered to be the responsibilities of citizens in their relations with the state. Again, enumerators recorded (yes/no) whether the responses fall within the following categories: (a) voting, (b) complaining when things do not go as they should, (c) suggesting actions to government agents, (d) attending meetings, (e) obeying the law, (f) paying taxes, and (g) supporting the government with financial

Table 1. Measures Related to the State Contract.

Family	Dependent variable	Observations	M	SD	Minimum	Maximum
Responsibilities of the state	Accept elections results	3,734	0.239	0.427	0	1
	React to complaints	3,734	0.521	0.500	0	1
	React to suggestions	3,734	0.446	0.497	0	1
	Avoid corruption	3,734	0.302	0.459	0	1
	Keep people informed	3,734	0.273	0.446	0	1
	Consult population	3,734	0.310	0.463	0	1
	Contribute resources	3,734	0.562	0.496	0	1
	<i>Family mean</i>	3,734	0.380	0.319	0	1
Responsibilities of citizens	Vote	3,733	0.334	0.472	0	1
	Complain	3,733	0.287	0.452	0	1
	Make suggestions	3,733	0.216	0.412	0	1
	Attend meetings	3,733	0.246	0.431	0	1
	Obey the law	3,733	0.597	0.490	0	1
	Pay Tax	3,733	0.459	0.498	0	1
	Support government	3,733	0.203	0.402	0	1
	<i>Family mean</i>	3,733	0.335	0.300	0	1
Value of state activities	Providing education	3,699	0.151	0.358	0	1
	Providing health care	3,686	0.133	0.339	0	1
	<i>Family mean</i>	3,736	0.143	0.307	0	1
Citizen Activities	Contact police	3,721	0.033	0.178	0	1
	Visit to government agency	3,733	0.032	0.176	0	1
	<i>Family mean</i>	3,734	0.033	0.152	0	1
Overall mean state contract		3,758	0.222	0.180	0	1

Note. *Family mean* is a simple average of the individual components for respondents who answered one or more of the questions within a family. *Overall mean* is a simple average of the four family means.

contributions and time. We again find evidence that the state contract is weak: Only 60% of respondents mention that obeying the law is important and only 46% view taxpaying as important; even fewer view the other obligations as being important, suggesting a significant disconnect between citizens and the modern state.

Value of state activities. Citizens need to value the activities of the state to fulfill their part of the social contract. Respondents were asked whether they value the actions taken by the state in the education and health sectors. Perceptions of the state are low: Only 15% (13%) of respondents value government activities in the health (education) sector.

Citizen activities. Finally, the survey asked about actual interactions between individuals and the state apparatus, along the lines of MacLean (2011). Specifically, respondents were asked whether they contacted the police or visited a government agency during the past 6 months. We find that only 3% of respondents had undertaken such activities.

We find that the first two items correlate strongly with each other and the third and fourth correlate positively but weakly with the other measures, suggesting that these tap into somewhat different dimensions of the state contract. We therefore explore these measures separately, but we also create an index—using a simple average—to examine overall effects.

Measuring the Traditional Contract

The household survey also contains indicators related to the ties between citizens and traditional authority, that is, the traditional contract. Unfortunately, there is no exact match between the questions that capture the traditional and modern social contract. There are, however, questions that let us hone in on citizens' perceptions of the chief as a development broker.

The survey gave respondents two hypothetical scenarios about the allocation and implementation of development funds. In the first scenario, the village receives funds earmarked for a select group of people (e.g., the most vulnerable, ethnic minorities, or disabled people). Enumerators asked who should have the most influence in selecting the beneficiaries from a pre-defined list of potential selectors, including chiefs. In the second hypothetical scenario, the village receives development funds for a number of public good projects. Respondents were then asked two questions: (a) who should have the largest influence in allocating these funds, and (b) who should oversee the implementation of the project. For all questions, we create a dummy variable that equals 1 if a respondent felt the chief should choose beneficiaries, be the

Table 2. Measures Related to the Traditional Contract.

Family	Dependent variable	Observations	M	SD	Minimum	Maximum
Desired role of chief as development broker	Beneficiary choice	3,853	0.517	0.500	0	1
	Fund allocation	3,853	0.422	0.494	0	1
	Project supervision	3,853	0.380	0.485	0	1
	Family mean	3,853	0.439	0.383	0	1

Note. Family mean is a simple average of the individual components for respondents who answered one or more of the questions within the family.

arbiter of development aid assignment, or oversee project implementation (and 0 otherwise). Table 2 presents the descriptive statistics, showing that 38% to 52% of respondents feel the chief should play the role of development broker under the different scenarios.¹⁵

External Shocks

To empirically fit the structural model, we rely on plausibly exogenous shocks to generate variation in valuation for traditional and modern authorities. We exploit two types of shock: those arising from weather variability and conflict. Not only are both types of shocks relevant for our research area (as discussed in section “Research Site: Governance in the Democratic Republic of Congo”), but previous work highlights that both types of shocks can affect attitudes and behaviors. Cole, Healy, and Werker (2012), for example, find a negative effect of weather events on vote share for the incumbent in India and show that fewer voters punish the government when the government supplies relief. Bechtelt and Hainmueller (2011) demonstrate sustained voter gratitude in response to the German government’s massive policy response to the 2002 Elbe flooding.¹⁶ The literature on conflict documents similar effects. Grosjean (2014) finds that exposure to war violence has a negative effect on trust in central government institutions. Voors and Bulte (2014) find a negative effect of conflict exposure on people’s perception of the central government in Burundi.¹⁷

Note that from our standpoint, the direct effects of shocks on social contracts are less important than the fact that these shocks generate exogenous variation in people’s latent valuations of different types of authority, allowing us to assess substitution and complementarity.¹⁸

We now describe the data for both shocks, which we match to the GPS locations for all study villages. Location information was collected as part of the household survey.

Table 3. Measures Related to the External Shocks.

Family	Independent variable	Observations	M	SD	Minimum	Maximum
Shocks	Rainfall shock	1,020	3.550	1.898	0.980	8.267
	Conflict shock	1,020	−0.028	0.328	−2.50	2.25

Source: National Oceanic and Atmospheric Administration’s (NOAA) Precipitation Reconstruction Data set and Armed Conflict Location and Event Data Project.

Rainfall shock. Rainfall data come from the widely used National Oceanic and Atmospheric Administration’s (NOAA) Precipitation Reconstruction (PREC) Data set (Chen, Xie, Janowiak, & Arkin, 2002).¹⁹ The data set contains global gridded monthly rainfall anomaly estimates at 2.5×2.5 latitude–longitude degree resolution. The data set is derived from observations from over 17,000 rain gauge stations. For each village, we interpolate PREC monthly rainfall anomalies from the 30-year trend for each village latitude–longitude coordinates.²⁰ To construct the village-level rainfall shock, we take the average of these observations for the 12 months prior to the household survey. On average, a village experienced precipitation levels of 106.99 mm/month in the year preceding the survey. The average rainfall deviation for our sample is 3.55 mm/month, with considerable variation per village: from 0.98 to 8.27 mm/month. Descriptive statistics are included in Table 3.

Conflict shock. We draw from the Armed Conflict Location and Event Data Project (ACLED), which provides information on the date and location of conflict events across the world (Raleigh, Linke, Hegre, & Karlsen, 2010).²¹ We narrow conflict events to those that caused more than 25 fatalities per year. Conflict shocks experienced by villages are computed as the difference in the average number of conflict events occurring in the 4 years prior to the survey and the 4 years prior to that. We associate a conflict event with a village if it occurred within a 15-km radius from its centroid. A village in our study experienced on average 0.14 events in the 4 years prior to our survey. Our shock measure shows a small and positive average decrease in conflict. On average, villages saw 0.03 fewer events per year during the 4 years immediately prior to the survey compared with the preceding 4 years (see Table 3), with some villages experiencing −2.5 events fewer and others experiencing 2.3 events more.

Empirical Strategy

For our analysis, we first follow previous studies and explore the correlation between the modern and traditional contracts. Subsequently, we fit the

model of complements and substitutes presented in section “Conceptualizing Complementarities in Support for Alternative Authorities.”

We follow Logan (2009) and estimate

$$G_{ij} = \alpha + \beta C_{ij} + X'_{ij}\Gamma + \varepsilon_{ij}, \quad (1)$$

where G_{ij} captures the support of an individual i in village j for the state and C_{ij} captures the support for traditional authorities, that is, the village chief. Both G_{ij} and C_{ij} are a simple family average of individual survey components (see Tables 1 and 2). We include a vector of control variables, X_{ij} , that are plausibly correlated with both perceptions of the state and chiefs (age, literacy, and gender).²² We cluster the error term, ε_{ij} , at the village level. We also run Equation 1 with village-level fixed effects, α_j , to assess within-village variation in the modern and traditional contracts. The focus here is on partial correlations and not on the estimation of causal effects. In this empirical setup, if modern state and traditional leadership are complements, β would be positive. If they are substitutes, it would be negative. As we discussed before, while such correlations are possibly informative, they are not dispositive for assessing the presence of complementarities or substitution in terms of citizen valuations.

Next, we return to the model of complements and substitutes. Our interest now turns to the σ parameter, that is, the substitution or complementarity effect. Measuring the elasticity of substitution parameter requires assessing the effects of changes to citizens' underlying valuations for government and traditional authorities (v_g and v_c). These factors, however, are latent and not directly measurable. In response, our estimation strategy makes use of a structural model. A structural model imputes relationships between unobserved constructs (latent variables) using the variances and covariances of observable variables. In our case, we make use of the variation introduced by rainfall and conflict shocks to learn about the latent factors of citizen's valuation of traditional and modern authority. Specifically, we assume that the underlying valuations of the chief and government are non-negative and subject to shocks. We, thus, allow

$$v_c = e^{\alpha_c + \beta_c RAIN + \gamma_c CONFLICT}, \quad (2)$$

$$v_g = e^{\alpha_g + \beta_g RAIN + \gamma_g CONFLICT}, \quad (3)$$

where *RAIN* and *CONFLICT* are our external shock variables (defined above). Allowing individual-specific error as well as cluster-level shocks in the expression of support for each type of authority (s_{ci} , s_{gi}), we have

$$s_{ci} = \frac{v_c^\sigma}{v_g^{\sigma-1} + v_c^{\sigma-1}} + \psi_{cj} + \varepsilon_{ci}, \quad (4)$$

$$s_{gi} = \frac{v_g^\sigma}{v_g^{\sigma-1} + v_c^{\sigma-1}} + \psi_{gj} + \varepsilon_{gi}, \quad (5)$$

where $(\varepsilon_{1i}, \varepsilon_{2i}) \sim N\left(0, \begin{pmatrix} \omega_c^2 & \omega_{cg} \\ \omega_{cg} & \omega_g^2 \end{pmatrix}\right)$, and ψ_{cj} and ψ_{gj} denote a chiefdom-level normally distributed random effect in the assessment of chiefs and government, respectively.²³ We estimate Models 4 and 5 allowing for both village and chiefdom random effects. We calculate the σ parameter using the data in Table 4, using a Bayesian model in Stan with flat priors over the admissible ranges of the parameters (see the supplemental appendix for the full model specification).²⁴

We note that this is a relatively simple model and that geographic effects are captured here only through the random effects. We also want to highlight two caveats of this approach. First, the structural model is model-based, and our inferences rely on the characterization of the data generating process. For example, the model assumes that elasticities of substitution are constant and uniform across subjects, and that (log) valuations are linear functions of shocks. To allow the elasticity of substitution to take all possible values in its domain, we need to transform the data so that the underlying valuations for both power structures (chief and state) are positive. Second, this type of model is computationally challenging, partially due to the nature of the objective function: a nonsmooth surface with local minima and a discontinuity when the elasticity of substitution is close to 1.²⁵ In practice multiple models similar to those we present failed to converge, highlighting the severity of the challenges to estimation.

Results

Modern and Traditional Contracts Are Negatively Correlated

Columns 1 to 5 of Table 4 present the results from Equation 1. Across the columns, we consistently find a negative and statistically significant ($p < .01$) correlation between perceptions of traditional institutions and the state. Columns 1 and 2, for example, show that individuals favoring a greater role for traditional leaders are associated with a 10 percentage point lower

Table 4. Correlation between Social Contract to the State and Traditional Institutions.

	1	2	3	4	5	6	7	8	9	10
	Resp.State	Resp. Citizen	Valuation State	Citizen Activities	Index	Resp.State	Resp. Citizen	Valuation State	Citizen Activities	Index
Desired role of chief	-0.104*** (0.013)	-0.067*** (0.012)	-0.053*** (0.013)	-0.015** (0.006)	-0.06*** (0.007)	-0.076*** (0.013)	-0.055*** (0.012)	-0.037*** (0.013)	-0.008 (0.006)	-0.045*** (0.007)
Age	0.013 (0.019)	0.034* (0.018)	0.015 (0.017)	0.018** (0.008)	0.019* (0.01)	0.035* (0.019)	0.04** (0.018)	0.03* (0.017)	0.027*** (0.008)	0.032*** (0.01)
Age2	-0.001 (0.002)	-0.003* (0.002)	-0.002 (0.002)	-0.002* (0.001)	-0.002 (0.001)	-0.003 (0.002)	-0.004* (0.002)	-0.003* (0.002)	-0.003*** (0.001)	-0.003*** (0.001)
Literate	0.029** (0.012)	0.028** (0.011)	0.026** (0.011)	0.014*** (0.005)	0.027*** (0.006)	0.026** (0.012)	0.027** (0.011)	0.024** (0.011)	0.015*** (0.005)	0.025*** (0.006)
Male	0.04*** (0.013)	0.056*** (0.012)	-0.006 (0.013)	0.016*** (0.006)	0.027*** (0.007)	0.045*** (0.013)	0.057*** (0.012)	-0.005 (0.013)	0.016*** (0.006)	0.028*** (0.007)
FE	N	N	N	N	N	Y	Y	Y	Y	Y
N	3508	3507	3509	3507	3528	3508	3507	3509	3507	3528
R2	0.029	0.027	0.007	0.012	0.039	0.078	0.062	0.053	0.044	0.087

Note. In all regressions, standard errors are clustered at the village level. Fixed effects at the village level are used in columns 6 to 10. For all regressions, the number of villages is 799—fewer than the visited 816 villages because of variable missingness. Resp. = responsibility; FE = fixed effects.

* $p < .10$. ** $p < .05$. *** $p < .01$ (two-tailed).

expressed opinion about the responsibilities of the state and a 7 percentage point lower expectation about their own responsibilities toward the state. We find similar results, albeit with smaller magnitudes, with respect to the value people report for government's activities and their actions related to the state. The overall effect is negative at 6 percentage points (column 5).

Columns 6 to 10 report results from the same multivariate analyses but include village fixed effects, effectively controlling for all village-level characteristics. Not surprisingly, these models capture significantly more variance in the state contract. Again, we find that all associations between the measures of the modern and the traditional contract, except for those related to citizen activities, are negative and statistically significant ($p < .01$). In the supplemental appendix, we provide results using individual question measures rather than family averages. The results are similar. The fact that these negative correlations are relatively unaffected by village fixed effects suggests that they are not driven by variation between regions in which the state is relatively more or less effective or in which traditional authorities enjoy relatively more or less legitimacy, but rather by *individual*-level variation in orientations.

A scholar interested in understanding whether traditional leadership and the state are substitutes or complements may, given this negative correlation, infer that both authorities are substitutes. However, as we have discussed in section "Conceptualizing Complementarities in Support for Alternative Authorities," to learn about substitution or complements requires a structural model. We return to this now.

But Modern and Traditional Leadership May In Fact Be Complements

Table 5 presents the results from estimating Equations 4 and 5. Column 1 shows the parameter estimates for the model with random effects at the chiefdom level. Column 2 shows results from the same model, but with fixed effects at the chiefdom and village level.

The CES parameter, σ , equals 0.205 and 0.209 with a credibility interval that is bounded away from 1, revealing evidence that modern and traditional institutions are complements in the minds of Congolese citizens. That is, a positive change in a citizen's valuation of the chief (government) translates into a positive change in support for the government (chief).²⁶

The nonlinear nature of our model makes it hard to read substantive effects directly from estimated parameters, and especially to discern the importance of the complementarity parameters. We can, however, provide an intuition by assessing how a shock maps to ultimate changes in support via different channels. The structural model suggests that a shock affects the support for an authority through two possible mediators: the valuation of that authority and the valuation of the other authority. For example, a rainfall shock can affect citizen

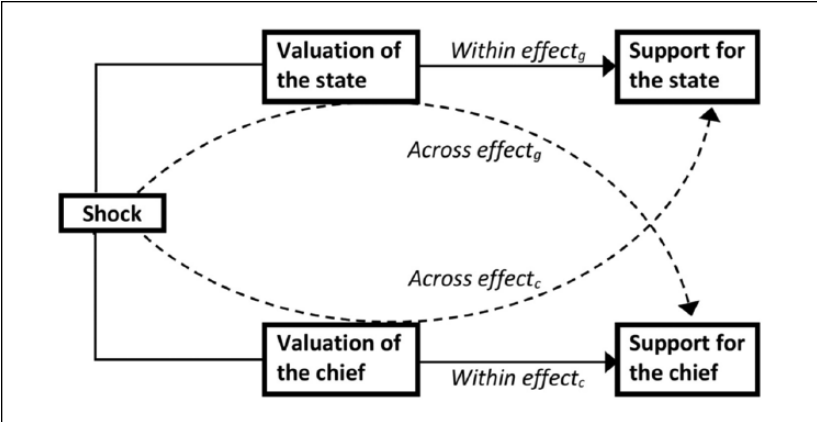


Figure 2. Causal pathways from shock to citizen support.
Note. Directed acyclic graph illustrating the causal pathways from shock to citizen support for traditional and state institutions.

support for the chief via changes in the valuation of the chief, the *within effect*, and/or via changes in the valuation of the government, the *across effect*. Figure 2 illustrates the structural relation in a directed acyclic graph.²⁷ In the remainder of this section, we undertake a mediation analysis to estimate these within and across effects.

First, we need to define small and large shocks. To value small shocks we take those shock levels that rank at the bottom 2.5 percentile in our data set, whereas large shocks are those in the top 2.5 percentile. For rainfall, a small shock amounts to 1.169 mm, that is, the bottom 2.5% villages experienced 1.169 mm or less precipitation in the year before our survey compared with the 30 years before that. A large rainfall shock, that is, the 97.5th percentile, is a deviation of 7.756 mm. For the conflict shock, the values for the small and large shocks are -1 and 0 conflict events, respectively.

Next, we use an approach similar to that sometimes used in mediation analysis (see Imai, Keele, Tingley, and Yamamoto (2011)): We assess the change in the support for one authority holding one of the mediators fixed at levels from small shocks and allowing the other mediator to be affected by a change in shock from small to large. The *within effect* of a shock on the support for the chief, for example, is calculated as the difference in support for the chief when moving the valuation of the chief under small shocks to that under large shocks, holding the valuation of the government fixed at values related to small shocks. The *across effect* of a shock on the support for the chief is calculated similarly, but the valuation of the chief is kept fixed at values from small shocks and the valuation of the government moves from a

small to a large shock. Specifically, given a shock, T , the within and across effects on citizen support for the chief are given by²⁸

$$Within_{c|L} : S_c \left(v_c(T = high), v_g(T = low) \right) - S_c \left(v_c(T = low), v_g(T = low) \right),$$

$$Across_{c|L} : S_c \left(v_c(T = low), v_g(T = high) \right) - S_c \left(v_c(T = low), v_g(T = low) \right).$$

Similarly, we could define quantities $Within_{c|H}$ and $Across_{c|H}$ where one considers a shift in one valuation from low to high while the other is fixed at high. Note that the total effect, shifting both valuations from low to high, equals $(Within_{c|H} + Across_{c|H} + Within_{g|H} + Across_{g|H})/2$.

Finally, we make use of Equations 2 and 3 and the parameter estimates in Table 5 to compute citizen valuations of the chief and the government for both small and large shocks. These values are then used to calculate citizen support for each authority using Equations 4 and 5. In total, we run 1,000 simulations and average across subjects.

In this section, given the weakness of the conflict instrument, we focus on the effect of rainfall shocks. We provide a graphical presentation of results in Figure A1 in the supplemental appendix. In addition, in the supplemental appendix we conduct the same analysis for conflict shocks.²⁹ Our core results are shown in Table 6. Note that—because a rainfall shock is a negative shock—positive values of the across effect correspond to substitution effects, while negative values correspond to complementarity effects.

We first consider the effect of a rainfall shock on the support for the government. Table 6 suggests that the within effect equals -0.08 , with a credibility interval of $(-0.15, -0.02)$. In other words, a rainfall shock has an appreciable effect on the support for the state *through changes in the valuation of the state*. In the presence of small shocks, the support for the government is equal to 0.24, but when a large rainfall shock occurs there is reduction via the valuation of the government of 0.08. Figure A1 in the supplemental appendix illustrates how small shocks are associated with high valuation of the government and how higher valuations of the government lead to more support for the government. In contrast, we find no evidence that a rainfall shock influences the support of the government *through the valuation of the chief*. The across effect is 0.0005 and the credibility interval contains zero—credibility interval: $(-0.02, 0.02)$.

Next, we consider the effect of a rainfall shock on the support for the chief. Table 6 shows that a rainfall shock does not affect the support for the chief *through changes in the valuation of the chief*. The within effect is equal to 0.02 and the credibility interval contains zero. In contrast, support

Table 5: Structural Model Parameter Estimates.

Parameter	Definition	1	2
σ	CES parameter	0.205 (0.101, 0.705)	0.209 (0.101, 0.69)
ω_g	Variance on ω_g	0.139 (0.133, 0.146)	0.126 (0.12, 0.133)
ω_c	Variance on c	0.03 (0.029, 0.031)	0.023 (0.022, 0.024)
ω_{gc}	Covariance on g, c	-0.008 (-0.01, -0.006)	-0.008 (-0.01, -0.007)
α_g	State intercept	-1.283 (-1.508, -0.784)	-1.386 (-1.612, -0.891)
β_g	Rain shock (State)	-0.07 (-0.137, -0.014)	-0.029 (-0.097, 0.034)
γ_g	Conflict shock (State)	-0.133 (-0.249, -0.033)	-0.136 (-0.294, 0.002)
α_c	Chief intercept	3.621 (0.25, 6.922)	3.968 (0.261, 7.566)
β_c	Rain shock (Chief)	0.076 (-0.316, 0.588)	-0.123 (-0.555, 0.313)
γ_c	Conflict shock (Chief)	0.874 (0.042, 2.017)	0.755 (-0.028, 1.924)
Random effects:		Chiefdom	Chiefdom + Village

Note. Columns 1 and 2 show, respectively, parameter estimates for a model with random effects at the chiefdom level and for a model with random effects at the chiefdom and village level. Credibility intervals in parentheses. Based on 4,000 simulations. CES = constant elasticity of substitution.

Table 6. The Impact of Complementarity: Within and Across Effects.

	Within effect	Across effect
Support for the state	-0.08 (-0.15, -0.02)	0.0005 (-0.02, 0.02))
Support for the traditional authorities	0.02 (-0.19, 0.33)	-0.15 (-0.26, 0.01)

Note. Estimates of the within and across effects from a change in rainfall on support for the state and traditional authorities. Credibility intervals in parenthesis.

for the chief does change through changes in citizen valuation of the government. This estimated across effect is equal to -0.15 with a credibility interval of $(-0.26, 0.01)$. In the presence of small shocks, the support for the chief is equal to 0.52 , but when a large rainfall shock occurs this support decreases *via the valuation of the government* to 0.37 . This result is perhaps the most important one: A rainfall shock reduces support for the chief not directly via valuations of chiefs, but because of the shock's effects on valuations of the state and the complementarity between support for the state and the traditional authorities.

In sum, we highlight three results. First, our results show that answering the question whether the state or traditional leaders are substitutes or complements requires researchers to move beyond exploring correlations and estimating more fundamental parameters—specifically, the elasticity of substitution—using a structural model. Second, we provide evidence that modern and traditional institutions are complements in the minds of Congolese citizens. Third, we provide evidence that this result runs through changes in the valuation of the state. For example, a rainfall shock decreases the valuation of the government which, in turn, decreases citizen support for both the government and the chiefs. We do not find that the complementarity result runs through changes in the valuation of the chief; one reason may be that citizens in our study area are considerably more exposed to the chief than to the state.

Conclusion

We focus on a long-standing and unresolved question about the political economy of governance in Africa using original survey data collected in the DRC: Are traditional leaders and states substitutes or complements in the hearts and minds of citizens? Consistent with earlier writings (e.g., Keulder, 1998; Oomen, 2000), we provide evidence that citizen views of the state and traditional chiefs are negatively correlated. Next, we dug more deeply into the concepts of substitution and complementarity using a structural model that sought to estimate substitution effects directly. The results suggest that citizens perceive traditional and modern authorities as *complementary* actors embedded in the same integrated system, along the lines postulated by Logan (2009) and Baldwin (2016)—a result that is different from what simple correlations suggest. This study thus highlights the value for researchers seeking to estimate the parameters of interest—in this case substitution or complementarity—directly, rather than relying on correlations.

What may explain that citizens perceive traditional and modern authorities as complementary? Our structural model exploits macro-level shocks

to reveal complementarity, but it does not provide a good handle on *why* these complementarities exist. That is, our macro-level data do not provide enough fine grain to account for citizen reasoning. A number of different logics, however, could account for these preferences. It may be that citizens believe that state and traditional leaders work effectively together—or provide a check on each other—so if they want more of one, they want more of the other to improve effectiveness. It is also possible that state and traditional leaders are mingled in the minds of citizens and the real trade-offs are between these on one hand and self-reliance or family networks on the other. Further investigating such explanations could be a rich agenda well suited to studies that leverage more fine-grained control via lab-in-the-field experimentation or that make use of qualitative data in ways that we do not here.

To what extent do the results from this study generalize beyond our study site? There are good grounds to expect external validity with respect to other villages in rural Eastern Congo as our subjects and villages were drawn randomly from larger populations. We have more limited leverage over the question of how far our results travel outside of this region. It is worth noting, however, that the environment of our study is similar to that found in many developing countries on some key dimensions. In many developing countries, formal and traditional institutions coexist, individuals are vulnerable to weather and conflict shocks, and a nontrivial number of citizens live in relatively isolated villages. For example, our data suggest that 45% of our villages have a cell-phone signal. This same information was collected in Round 6 (2014/2015) of the Afrobarometer. Insofar as cellphone coverage in the village relates to isolation of villagers, the villages in our study rank low, but not at the bottom of the African continent. Two of 18 other countries rank lower than Congo (Burkina Faso at 25% and Senegal at 29%). Similarly, the fact that citizens are incompletely informed about government officials is not unique to the Congo. Round 4 (2008/2009) of the Afrobarometer asked whether a respondent knows the name of their member of parliament; seven out of the 20 countries have a correct response rate that is equal or lower than that found in the Congo. In other words, while there is no question that the state is weak in Congo, state weakness is clearly a more general phenomenon.

The deeper question for external validity, however, is whether the logics of substitution operate differently in places where the state apparatus is stronger. A priori we have no reason to expect that they would; for instance, it is plausible that when states are weak, coordination with traditional authorities is essential for effectiveness, giving rise to demand complementarities that may disappear if states reach a level of development where they can operate effectively on their own, when they choose to do so. Given this possibility,

we would not claim that these results would hold under all circumstances, although we believe the framework we provide opens up avenues for examining this question in a multitude of contexts.³⁰

We end this discussion by noting that while we believe the characterization of substitution and complementarities in terms of a demand model is clarifying, we do not argue that this in any way exhausts the logics through which complementarities may operate. For instance, the framework presented in this study focuses on citizen responses, not on the actions of different authorities. Of course, logics of competition or coordination between authorities could produce outcomes that look like substitution or complementarity in support, though operating through common shocks to the u terms in our model.³¹ Similarly, our results do not preclude logics like that in Brass (2016), in which one authority succeeds in claiming credit for the product of another. In our framework, credit claiming might produce a positive correlation in the underlying valuations (the v terms) whether or not there are complementarities in demand. Similarly, the model does not elucidate *how* these logics work. For instance, we might think of the CES utility as representing a reduced form from a learning model in which learning about the quality of one actor is informative about the quality of another or representing beliefs about complementarities in how authorities respond to support. We believe that unpacking these dynamics is a fruitful avenue for future work.

Authors' Note

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Supplemental Material

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Notes

1. See Bates (1976) and Bond (1976) for a careful discussion.
2. Social contracts and legitimacy (trust in government) are inherently related, as perceptions of legitimacy clearly underpin any social contract (Keele, 2007). We believe the term social contract is broader conceptually than legitimacy because it also entails beliefs about citizens' understanding of the extent to which they have an incentive to monitor and obey the state.
3. Brass (2016) shows in a related domain that effective service provision by non-governmental actors is associated with increased legitimacy of the state, suggesting that rather than being seen as rival, external provision can produce an expanded notion of what the state is.
4. In fact, same-signed responses to external shocks are also not sufficient to know whether states and traditional leadership are substitutes or complements. An external shock can increase demand for two commodities even if they are substitutes.
5. Although there are no actual prices or budgets in this formulation, this framing can be given a consumer interpretation, in a model in which individuals maximize utility $(s_c^p + s_g^p)^{1/p}$ subject to $s_c / v_c + s_g / v_g \leq 1$. Here, the valuations can be thought of as inverse prices: Increasing valuations is like lowering prices with a fixed budget constraint, making it possible to support both authorities more.
6. To be precise, our estimand of interest is the cross-price elasticity of demand. This differs from the elasticity of substitution parameter in the following way. Whereas the cross-price elasticity of demand captures the change in support for the chief as the valuation of the state changes $((\delta(s_c)/\delta(v_g))/(s_c/v_g))$ (and similarly for the state), the elasticity of substitution captures the change in the relative support for the chief when the relative valuation of the state goes up or down. Formally, $(\delta(s_c/s_g)/\delta(v_c/v_g))/((s_c/s_g)/(v_c/v_g))$, which is exactly equal to σ given our assumptions. These two elasticities capture distinct notions of complementarity. In practice, we estimate σ —the elasticity of substitution—which is informative for the cross-price elasticity given our assumed demand functions because $\sigma > 1$ implies substitution in terms of cross-price elasticities and $\sigma < 1$ implies complementarities.
7. This result can be seen from the expressions above and is a consequence of the fact that the constant elasticity of substitution (CES) function is homothetic.
8. See, for example, van der Windt and Humphreys (2016) for a detailed analysis of violence in South Kivu province.
9. In the conclusion, we discuss external validity, putting these numbers in the context of other countries.
10. Note that some studies suggest that conflict has led to a weakening of traditional authorities (e.g., Raeymaekers, Menkhau, & Vlassenroot, 2008).

11. The top responses in descending order were as follows: village chief (58 percent), villagers themselves (19 percent), religious leaders (9%), village chiefs' close associates like the village elderly (7%), the state (3%), youth associations (1%), and women associations (1%).
12. Our study thus does not make use of panel data but leverages variation across villages.
13. <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/BSASJR>
14. The original sampling frame included 5,600 households in 1,120 villages. There are a number of reasons for the attrition. Chief among these reasons was data loss in Maniema province due to political tensions in the run up to the 2011 elections, which led to the expulsion of the survey teams. Other data loss occurred due to inaccessibility of communities for security and logistical reasons, such as theft of tablets. We discuss attrition in more detail in the supplemental appendix, where we show that the probability of village attrition is unrelated to the independent variable that we discuss below.
15. Other actors chosen by respondents include the following: villagers (23%-31%, depending on the question), religious leaders (around 10%), and village wise men (8%-9%). Only around 2% mentioned the Congolese government. This is important because the question phrasing could in principle introduce a trade-off specifically between the state and traditional authorities. In practice, however, this is not the case.
16. This example highlights a complexity with shocks of this form: citizens may directly blame authorities for shocks, but they might also be responding to the responses to shocks, which, in different places, may be above or below expectations.
17. See also Blattman (2009), Bellows and Miguel (2009), and Carmil and Breznitz (1991).
18. A core assumption in our analysis is that the exclusion restriction holds, that is, we assume that that effect of a shock on support works uniquely through valuations of authorities and not through other channels. This assumption implies, for example, that we assume no sorting of people along certain attitude types due to migration.
19. Precipitation Reconstruction (PREC) data are publicly available from NOAA/OAR/ESRL PSD, Boulder, Colorado, USA; see <https://www.esrl.noaa.gov/psd/>.
20. For each village location, we take the four adjacent grid cells and use an inverse distance weighting based on the latitude and longitude of each cell, creating a unique value for close to all villages.
21. Armed Conflict Location and Event Data Project (ACLED) provides data on different conflict events: battles, riots, violence against civilians, and so on. We combine information from all types of events in our definition of conflict.
22. For reasons of simplicity, we focus on a limited number of control variables. Our results do not change appreciably when using a more complete set of individual-level characteristics.
23. Note that the data generating process described above allows for the possibility that errors across the two equations are correlated, which reflects the possibility

- that, for example, additional omitted variables affect both outcomes. Such features could induce a positive or negative correlation without implying substitution or complementarity between the traditional and the state contracts.
24. In estimating this model we frequently met with challenges around model convergence. In response, we adopted a procedure in which we ran our structural model with 20 Markov chains of length 4,000 each, and selected those that had zero divergent iterations. We then isolate these chains and draw from their posterior distributions to estimate averages and credibility intervals for each parameter. As a robustness check, we repeat this procedure but accepting all chains with five divergent iterations or fewer. This approach produces very similar results.
 25. See Henningsen and Henningsen (2012) for a more detailed discussion on this topic. In our experience, we see considerable model sensitivity—not in the sense of estimates changing, but in the sense of models that are close to what we report here failing to converge. We note that we tested a set of models that we thought could characterize the data generating process better in some ways. However, many of these alternative specifications were not convergent, possibly due to the complexity of the model and the issues mentioned in the paragraph above.
 26. Note that the evidence for effects of the shocks on valuations is not strong, with the strongest effects found for negative impacts of rain shocks on support for the state (β_g).
 27. Note that we assume that there is no direct causal connection between the two mediators.
 28. Equivalently for the government, the within and across effects are as follows: $S_g(v_c(T=low), v_g(T=high)) - S_g(v_c(T=low), v_g(T=low))$ and $S_g(v_c(T=high), v_g(T=low)) - S_g(v_c(T=low), v_g(T=low))$.
 29. Although the patterns are largely similar, we find no statistically significant within or across effects of conflict shocks.
 30. More specifically, we believe that a similar study but examining a region with greater variation in state strength may want to drop the assumption of a CES.
 31. More formally, in our model, the u terms are inputs into the CES function, yet they might also be joint outputs of a production function that itself exhibits elasticities of substitution or complementarity.

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