SUPPLEMENTARY MATERIAL

ELECTORAL CONSEQUENCES OF COLONIAL INVENTION
Brokers, Chiefs, and Distribution in Northern Ghana

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Contents

1 Summary statistics

Summary statistics for the analysis of resource distribution are in Table SI.1.

Table SI.1: Summary Statistics: Census Analysis

Variable	Mean	SD	Min	Max	N
Village of "always chief" group (0,1)	0.20	0.40	0.00	1.00	3918
Village of "invented chief" group (0,1)	0.35	0.48	0.00	1.00	3918
Village of "never recognized" group (0,1)	0.25	0.43	0.00	1.00	3918
% from "always chief" groups	0.24	0.38	0.00	1.00	3885
% from "invented chief" groups	0.40	0.44	0.00	1.00	3885
% from "never recognized" groups	0.30	0.40	0.00	1.00	3885
% with electricity (2010)	0.10	0.24	0.00	1.00	3885
% with electricity (2000)	0.03	0.09	0.00	0.90	3885
% with some secondary education (2010)	0.04	0.05	0.00	0.71	3885
% with some secondary education (2000)	0.07	0.05	0.00	0.46	3885
% with completed middle school education only (2000)	0.03	0.03	0.00	0.22	3885
% with pipe-borne water (2010)	0.05	0.15	0.00	1.00	3885
% with pipe-borne water (2000)	0.05	0.11	0.00	0.99	3885
% with borehole water (2010)	0.54	0.39	0.00	1.00	3885
% with borehole water (2000)	0.51	0.34	0.00	1.00	3885
% with public sector employment (2010)	0.01	0.04	0.00	0.65	3884
% with public sector employment (2000)	0.02	0.03	0.00	0.62	3885
% with formal (incl. public) sector employment (2000)	0.14	0.15	0.00	0.93	3885
% with trash collected (2010)	0.07	0.21	0.00	1.00	3885
% with trash collected (2000)	0.02	0.08	0.00	0.98	3885
Village included in split district b/w 2000 and 2010 (0,1)	0.67	0.47	0.00	1.00	3883
ln(Village population in 2000)	5.78	1.59	-1.05	9.22	3885
Ethnic fractionalization (2010)	0.23	0.23	-0.00	1.00	3885
Weighted-average of distance to MP's hometown (km) (2000 to 2010)	17.36	11.42	0.09	107.11	3884
Distance to 2000 district capital (km)	23.78	15.81	0.10	104.00	3884
Distance to closest 2000 electrified EA (km)	12.84	11.42	0.00	80.30	3884
Distance to closest 2000 EA w/ running water (km)	10.02	9.09	0.01	59.06	3884
Index of overlap b/w 2000 and 2010 EAs	0.70	0.24	0.14	1.00	3885

2 Dropping cross-appointed "never recognized" chiefs

I use official registries of currently gazetted (legally-recognized) chiefs in the three northern regions obtained from the National House of Chiefs to identify communities in which someone from a "never recognized" ethnic group has been cross-appointed within the hierarchy of a nearby "always chiefs" or "invented chiefs" group. Based on the ethnicity of chief's names, I am able to identify 27 communities in which a chief is officially cross-appointed in this manner. Figures SI.1 and SI.2 replicate the main results from the text – Figures 3 and 5 – and show that they are robust to excluding this small set of communities.

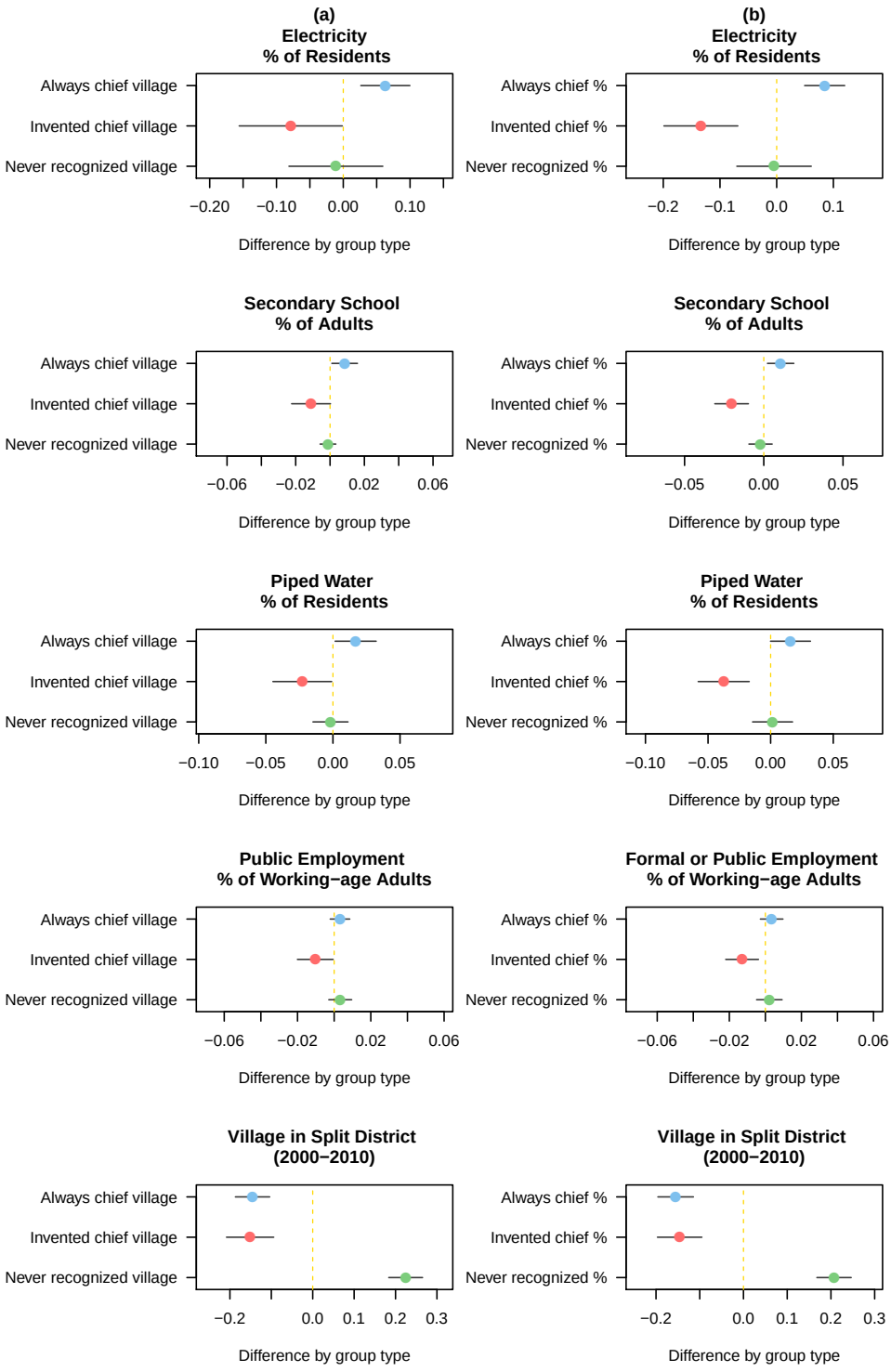

Figure SI.1: *Figure 3 with communities with cross-appointed chiefs dropped.*

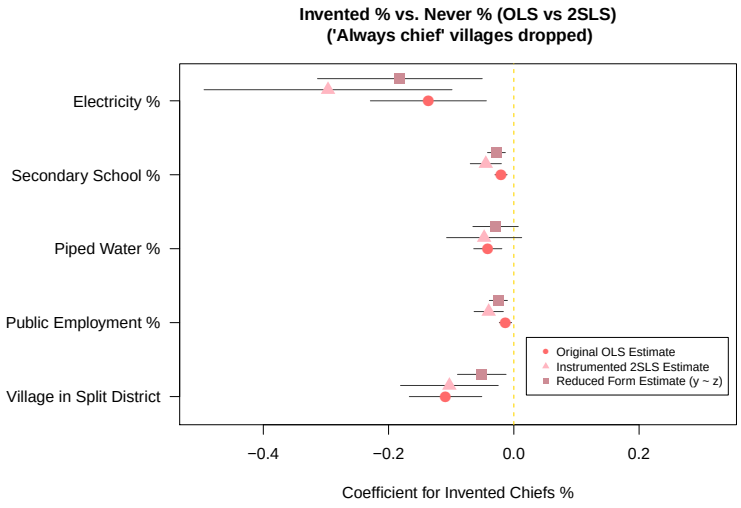

Figure SI.2: *Figure 5 with communities with cross-appointed chiefs dropped.*

3 Table 3 with logistic regressions

Table 3 in the main text uses linear probability models (OLS) to ease reader's interpretation. Logistic regressions may be more appropriate, however. Table SI.2 replicates Table 3 instead using logistic regressions. The results are similar.

Table SI.2: Party contact by chieftaincy type, Afrobarometer respondents

	1	2	3	4
Outcome:	Campaign gift	Party agent contact	Party agent contact	Party agent contact
"Never recognized" group (0,1)	1.279^{**}	0.923^{***}		
	(0.440)	(0.258)		
"Always chief" group (0,1)	0.265	1.006^{***}		
	(0.441)	(0.239)		
Same group as local Traditional Area (0,1)			-0.491^{***}	
			(0.143)	
Distance (km) to Closest Major Chieftaincy				0.272^{**}
				(0.103)
Age (years)	0.005	0.002	0.005	0.004
	(0.017)	(0.005)	(0.005)	(0.004)
Female (0,1)	-0.091	-0.972^{***}	-0.958^{***}	-0.973^{***}
	(0.352)	(0.177)	(0.168)	(0.165)
Secondary education (0,1)	-0.501	-0.190	-0.214	-0.140
	(0.630)	(0.194)	(0.162)	(0.181)
Assets index	0.504	0.533^{***}	0.546^{***}	0.541^{***}
	(0.317)	(0.070)	(0.083)	(0.086)
Community electricity access %	-1.048	0.401	0.506	0.505
	(0.886)	(0.565)	(0.577)	(0.534)
Community secondary education %	2.304	-6.169^{*}	-7.187^{*}	-7.370^{*}
	(3.912)	(2.712)	(2.968)	(3.075)
Community formal sector employ. %	-7.916	2.751	2.274	5.027
	(8.075)	(3.623)	(3.754)	(3.362)
ln(Community population)	0.218	0.020	0.097	0.182
	(0.305)	(0.144)	(0.140)	(0.122)
Margin of previous presidential election	1.712	0.418	-0.393	-0.033
(parl. constituency level)	(1.676)	(0.859)	(0.814)	(0.651)
Afrobarometer round 6 (0,1)	0.717^{**}	0.809^{**}	0.679^{*}	
		(0.242)	(0.275)	(0.280)
Constant	-4.785^{***}	-3.070^{***}	-2.486^{**}	-3.776^{***}
	(1.412)	(0.761)	(0.768)	(0.624)
N	379	664	664	664
Afrobarometer survey clusters	49	90	90	90
Afrobarometer round(s)	R5	R5, R6	R5, R6	R5, R6

† significant at $p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$. Logistic regression coefficients with robust standard errors clustered by ethnic group. To ease interpretation, I drop the small minority of respondents living in the north who are from southern ethnic groups.

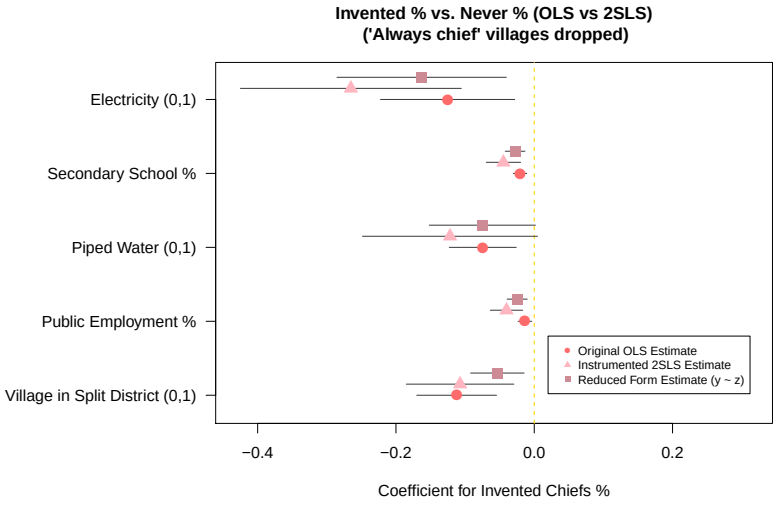

Figure SI.3: *Figure 5 with dichotomized outcomes for electricity and water.*

4 Dichotomous differences rather than marginal levels

The main analyses focus on marginal changes in the first 4 resources in Figures 3, 4, and 5. For two outcomes – electricity and piped water – it may be more appropriate to dichotomize the dependent variable as a measure of whether a resource is provided at all (i.e., whether a community is connected to the grid or not). Figure SI.3 replicates Figure 5 from the main text after dichotomizing electrification and running water into binary outcomes, set as 0 for communities with no access to the resource and 1 for communities with any access. The OLS, 2SLS, and reduced form results are all substantively identical.

5 District-level ethnic diversity in the north

As of 2000, many northern districts were large and ethnically diverse, with communities with different chieftaincy histories within the same districts.[1] Table SI.3 calculates ethnic composition at the 2000 district boundaries, used for the fixed effects in the analyses of resource distribution ($N = 23$ districts, with Tamale dropped). I calculate ethnic fractionalization in two ways: for all northern ethnic groups and for four categories aggregated by chieftaincy history (always chiefs, invented chiefs, never recognized, other). Both measures show that while a few districts were very ethnically homogeneous, the typical district had multiple types of ethnic groups within its boundaries.

[1]Note that this has changed over time, however, as new districts carved out between 2000 and 2010 often were tailored to reward specific ethnic groups.

Table SI.3: Ethnic Diversity within 2000 Administrative Districts

Variable	Median	Mean	Min	25th	75th	Max
Ethnic fractionalization (29 categories) %	0.48	0.49	0.09	0.40	0.68	0.79
Ethnic fractionalization (4 categories) %	0.30	0.36	0.09	0.20	0.56	0.68
Always chiefs %	0.17	0.27	0.00	0.02	0.46	0.95
Invented chiefs %	0.49	0.41	0.00	0.02	0.85	0.96
Never recognized %	0.11	0.25	0.00	0.03	0.40	0.93

6 Goods distribution: dropping NDC strongholds

The main results are robust to dropping the communities most likely to be NDC strongholds. I identify all census enumeration areas in which polling stations in the 2012 and 2016 elections – the only elections for which polling station-level results are available – voted consistently in the 75th percentile or higher for the NDC presidential candidate relative to the distribution of vote shares across Northern Ghana. These are the communities most likely to be consistent NDC strongholds over time. The 75th percentile in 2012 was 77% NDC vote and 72% NDC vote in 2016. Figures SI.5 and SI.4 replicate Figures 3 and 5 in the main text dropping the 584 enumeration areas that meet these criteria. The results are also similar when instead subsetting to all enumeration areas with NDC vote share above 75% in either election (not shown). Together, these tests suggest that the main results also hold among competitive and NPP-aligned communities.

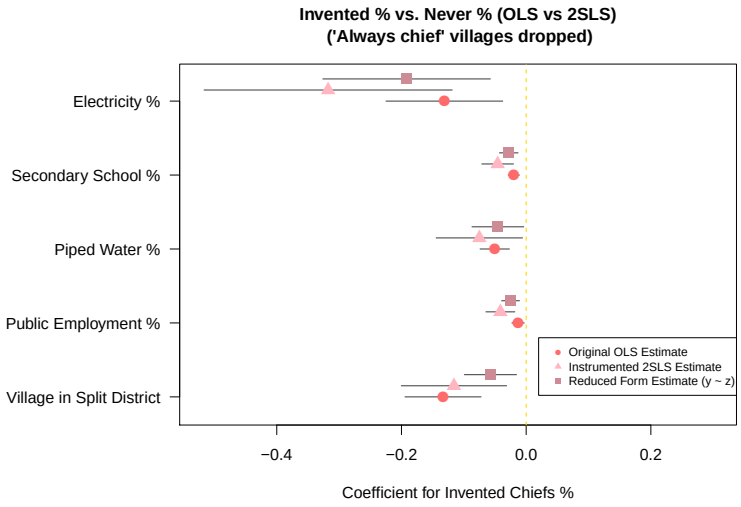

Figure SI.4: *Figure 5 with most likely NDC strongholds dropped.*

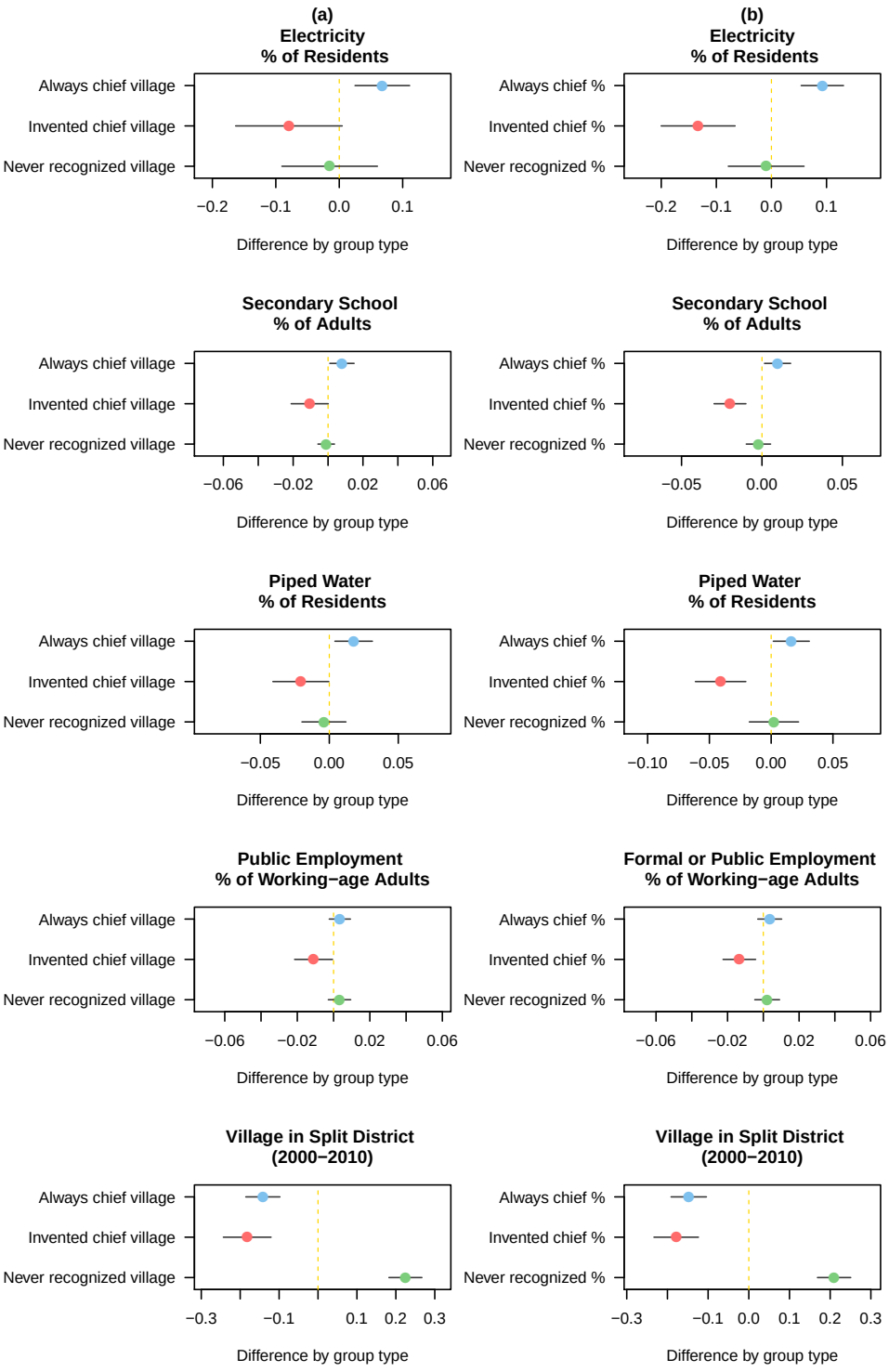

Figure SI.5: *Figure 3 with most likely NDC strongholds dropped.*

7 Collective action by group

Respondents from groups with invented chiefs are most likely to act collectively, suggesting that collective action cannot explain the main results in the text. Table SI.4 uses two Afrobarometer outcome variables from Rounds 4-6. The first is an indicator whether a respondent ever joined with others in his/her community to act collectively on an issue.[2] The second collapses two questions measuring participating in community-level civic associations or other civil society groups – the types of organizations that could oversee a community's self-provision of local public goods – into a binary indicator for any associational membership.[3] In Table SI.4 I regress these indicators on each respondent's group type, plus the same covariates as Table 3. These models are logistic regressions with standard errors clustered by ethnic group.

Table SI.4: Collective action by chieftaincy type, Afrobarometer respondents

	1	2	3	4	5	6
Outcome:	Joins with others for action	Joins with others for action	Joins with others for action	Civic association member	Civic association member	Civic association member
"Always chief" group (0,1)	-0.521^{**}			$-0.338^{\dagger}$		
	(0.195)			(0.192)		
"Invented chief" group (0,1)		0.780^{***}			0.543^{*}	
		(0.178)			(0.218)	
"Never recognized" group (0,1)			-0.249			-0.224
			(0.275)			(0.217)
Individual-level controls (from Table 3)	Y	Y	Y	Y	Y	Y
Community-level controls (from Table 3)	Y	Y	Y	Y	Y	Y
N	836	836	836	848	848	848
Afrobarometer round(s)	R4, R5, R6	R4, R5, R6	R4, R5, R6	R4, R5, R6	R4, R5, R6	R4, R5, R6

† significant at $p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$. Logistic regression coefficients with robust standard errors clustered by ethnic group. All controls as in Table 3.

[2] Q: "Here is a list of actions that people sometimes take as citizens. For each of these, please tell me whether you, personally, have done any of these things during the past year. If not, would you do this if you had the chance: Got together with others to raise an issue?"

[3] Q1: "Let's turn to your role in the community. Now I am going to read out a list of groups that people join or attend. For each one, could you tell me whether you are an official leader, an active member, an inactive member, or not a member: A religious group that meets outside of regular worship services?" AND Q2: " Let's turn to your role in the community. Now I am going to read out a list of groups that people join or attend. For each one, could you tell me whether you are an official leader, an active member, an inactive member, or not a member: Some other voluntary association or community group?"

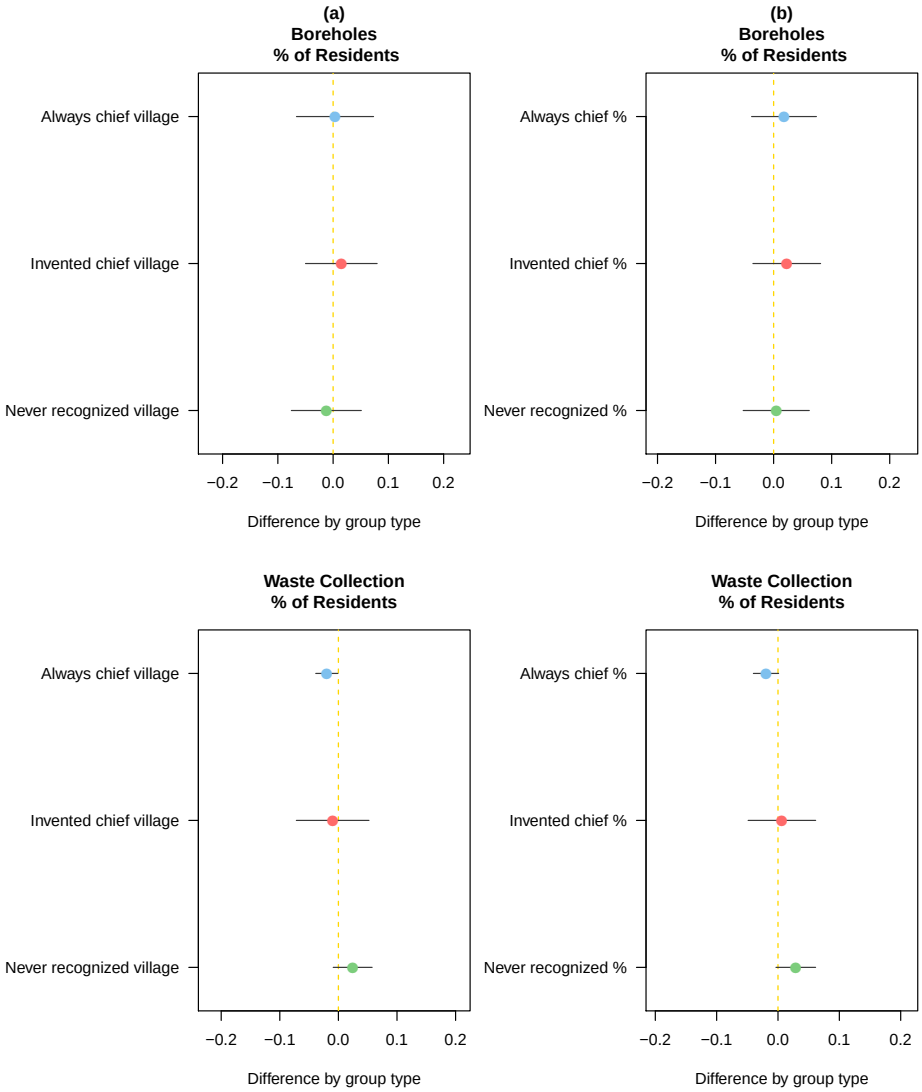

Figure SI.6: *Figure 3 for two additional outcomes:* boreholes and waste collection.

8 Placebo tests for self-providable resources

I conduct placebo tests for two other services measured on the census that communities could possibly self-provide in the absence of state involvement: boreholes and communal trash collection. In contrast to the main results, communities dominated by groups with "invented chiefs" are *not* disadvantaged in these two other resources. Figure SI.6 repeats Figure 3 for these two new outcome variables and finds no differences across groups. Repeated versions of Figures 4 and 5 return similar results (not shown).

9 Other cultural differences by group

I repeat the analysis after adding new control variables that account for other possible cultural differences between ethnic groups. For brevity, I repeat estimates for Figure 3 here. Replicated versions of Figures 4 and 5 with these new controls are also similar (not shown).

First, Figure SI.7 adds a control for the proportion of the community's population that is Muslim. Second, Figure SI.8 adds a control based on Murdock's (1967) coding of whether groups traditionally live in compact villages – conducive to the development of close daily social ties across families – or instead live in scattered homesteads, with individual families living apart from each other on their own farms. The control is the proportion of the population in each enumeration area with compact settlement traditions. I also drop communities with majority populations from groups that are not included in Murdock (1967), and thus for which this variable is missing. I view this as a proxy for other features of internal group social structures. Ethnic groups in Northern Ghana vary widely on this dimension, with about half of groups using each type of settlement pattern, and one group – the Fulani – living a more nomadic lifestyle. This also cross-cuts differences in chieftaincy structures.

Third, Figure SI.9 controls for the possibility of cultural differences related to groups' inheritance structures. Gottlieb and Robinson (2017) show that differences in cultural rules over inheritance – whether groups are matrilineal or patrilineal – predict significant differences in political behavior across Africa, especially among women. I again draw on data from Murdock (1967) and drop communities with majority populations from groups for which this variable is missing. Murdock (1967) codes northern Ghana as fairly evenly split between patrilineal and duo-lineal (mixed-gender) inheritance systems, with no major matrilineal groups, as are common in southern Ghana. The main results are robust in each alternative specification, except for "village in split district" in Figure SI.9.

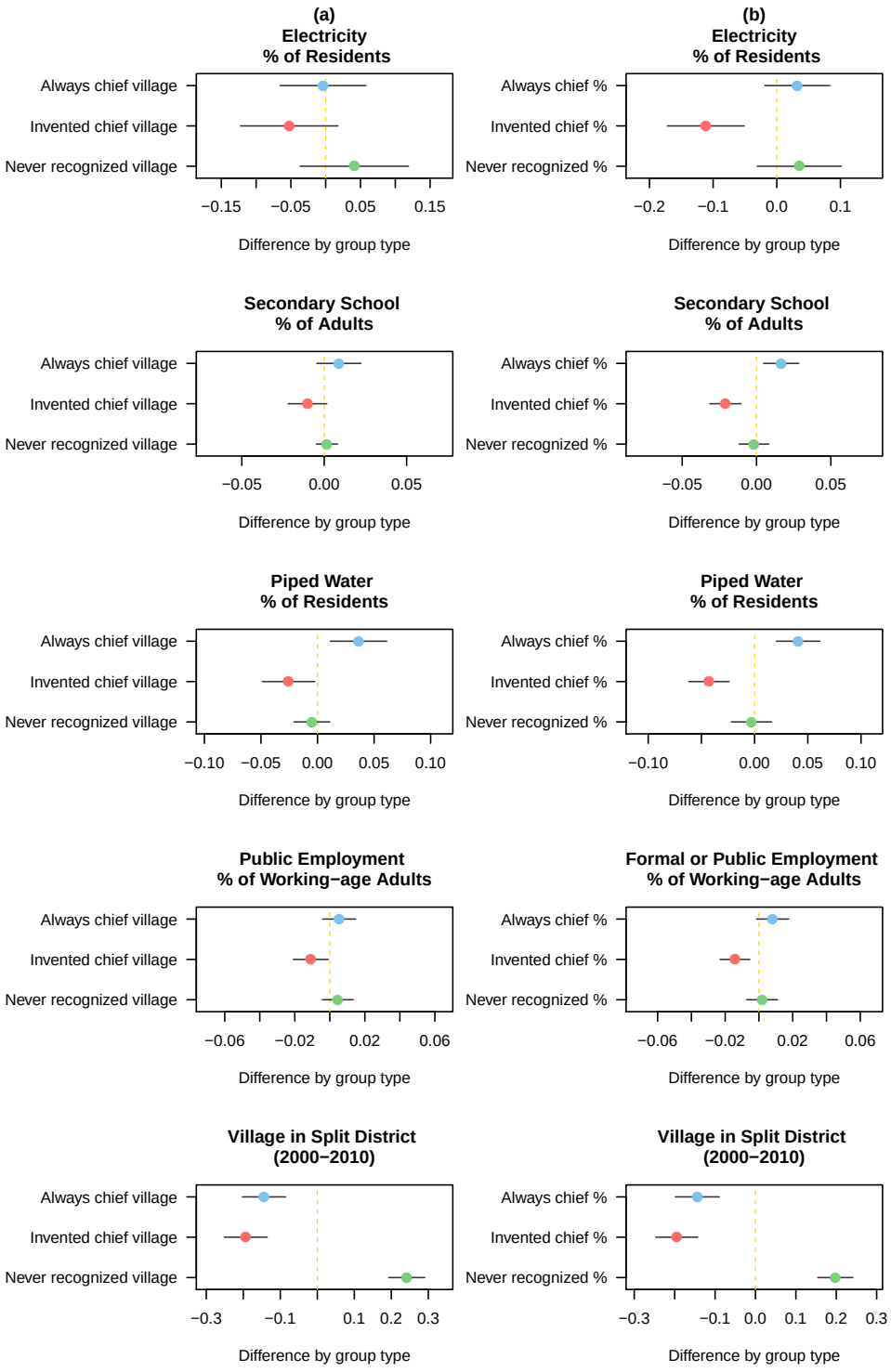

Figure SI.7: *Figure 3 controlling for Muslim population share.*

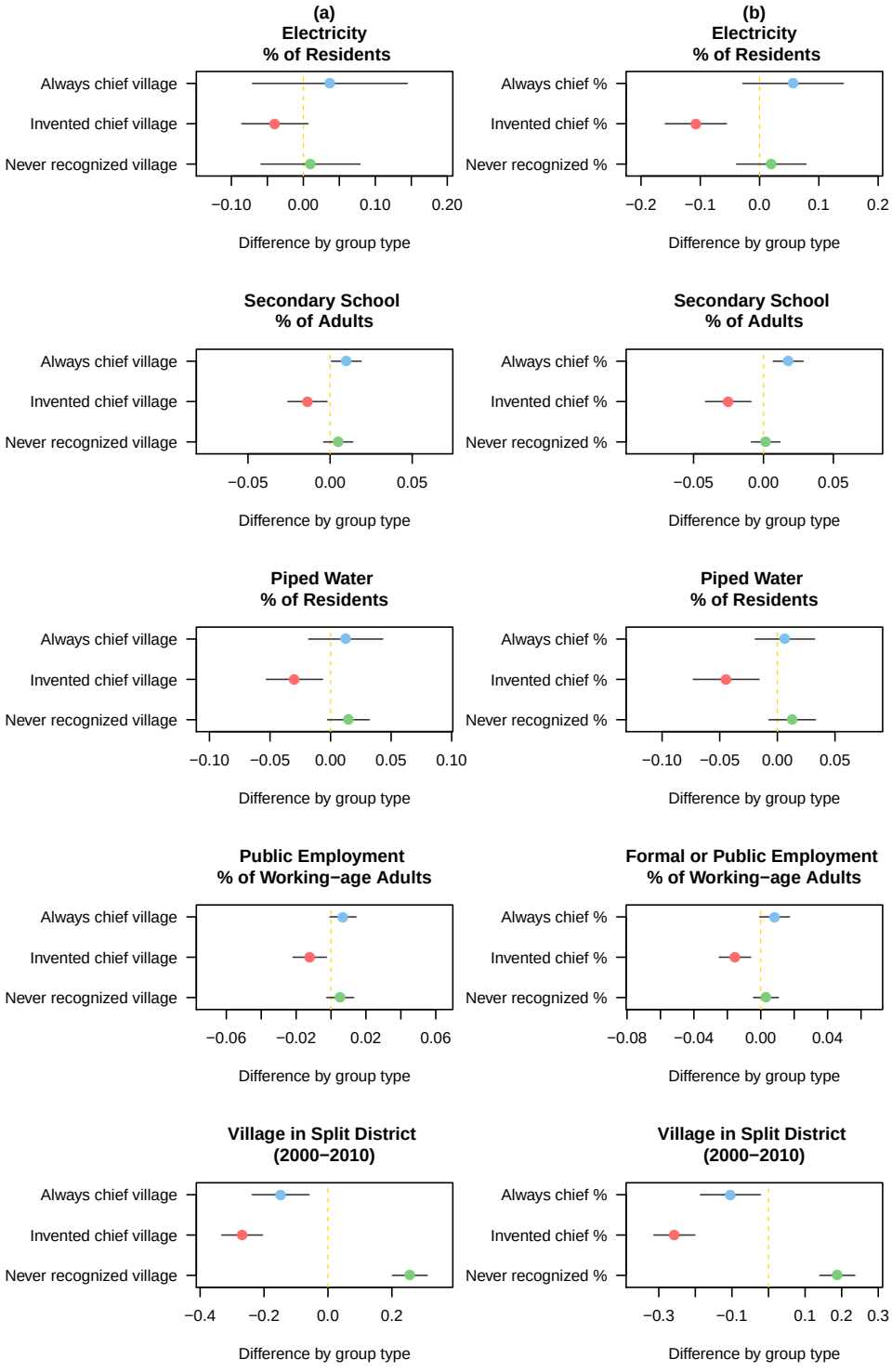

Figure SI.8: *Figure 3 controlling for population share from groups with "compact" settlement patterns.*

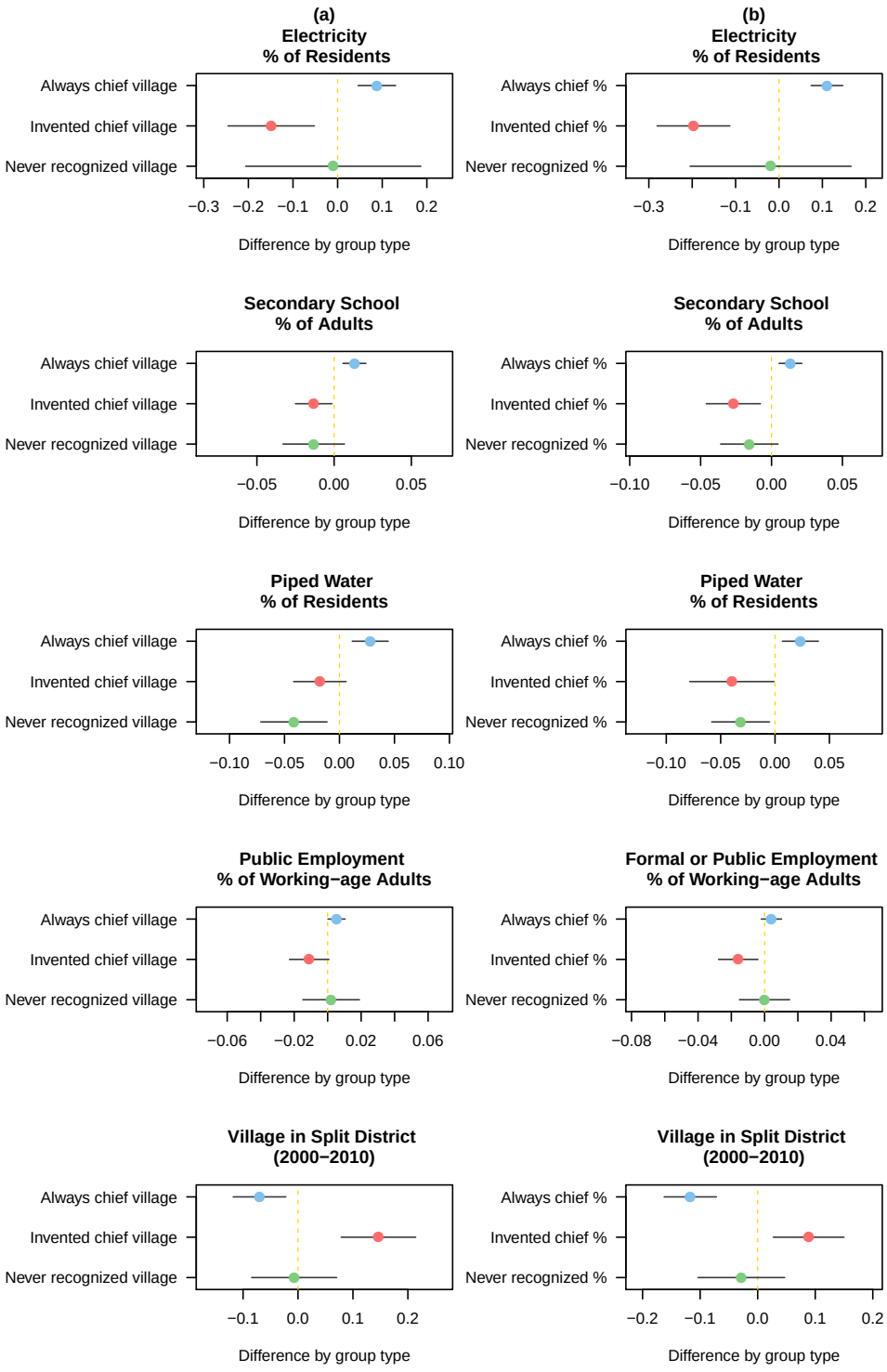

Figure SI.9: *Figure 3 controlling for population share from groups with patrilineal inheritance.*

10 Sequentially dropping each group

A "jack-knife" analysis demonstrates that the main OLS results for the disadvantages of "invented chiefs" groups in access to resources are robust to sequentially dropping every specific ethnic group. I repeat the models for the effect of the "invented chiefs" variable in column 2 of Figure 3 in the main text, sequentially dropping all enumeration areas with majority populations from each of the specific ethnic groups in Table 1. The resulting coefficient estimates are in Figure SI.10. A similar analysis for Figures 4 and 5 returns a similar conclusion: the main findings are not being driven by any outlier group that has unusual features.

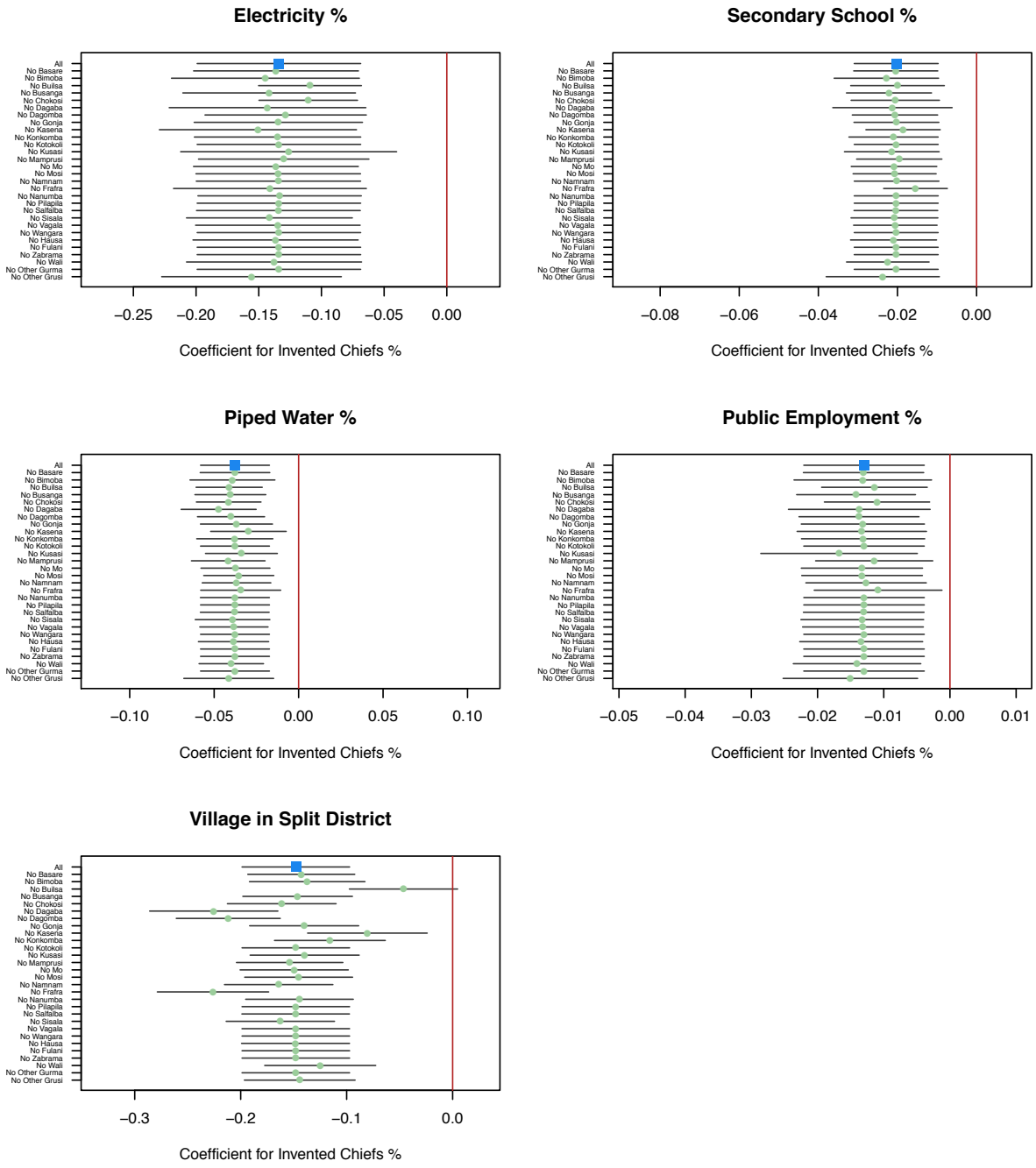

Figure SI.10: *Figure 3, sequentially dropping each ethnic group*: OLS coefficients with 95% confidence intervals. Repeats models from column 2 of Figure 3 dropping all enumeration areas with majority populations from the listed ethnic group. The blue dot is the original estimate from Figure 3.

11 Ruling out conflict and violence

Northern Ghana had several isolated inter- and intra-ethnic conflicts during 2000-2010. Conflicts cut across group types; some featured never recognized groups (e.g., Konkomba-Bimoba, intra-Bimoba), some featured groups with invented chiefs (e.g., Kusasi-Mamprusi), and some featured groups that have always had chiefs (e.g., Kusasi-Mamprusi, intra-Dagomba).

I use geo-located conflict event data from ACLED (2016) to control for the distance of each enumeration area to a conflict hot spot. I restrict to incidents in which at least 1 person died; ACLED records 18 such incidents. The most violent conflicts were between the Mamprusi and Kusasi over control of the Bawku paramountcy (Lund 2008), within the Dagomba ethnic group over control of the Dagomba paramountcy in Yendi (MacGaffey 2006, MacGaffey 2013), and between and within Bimoba and Konkomba communities over access to land. I correct ACLED's geo-codes for several of these incidents using more detailed place names available in the census enumeration area map. I then calculate the distance (in km) of all census enumeration areas to the nearest conflict location and include this as a control in Figure SI.11, which repeats Figure 3. I find identical results. Figures 4 and 5 are also similar (not shown).

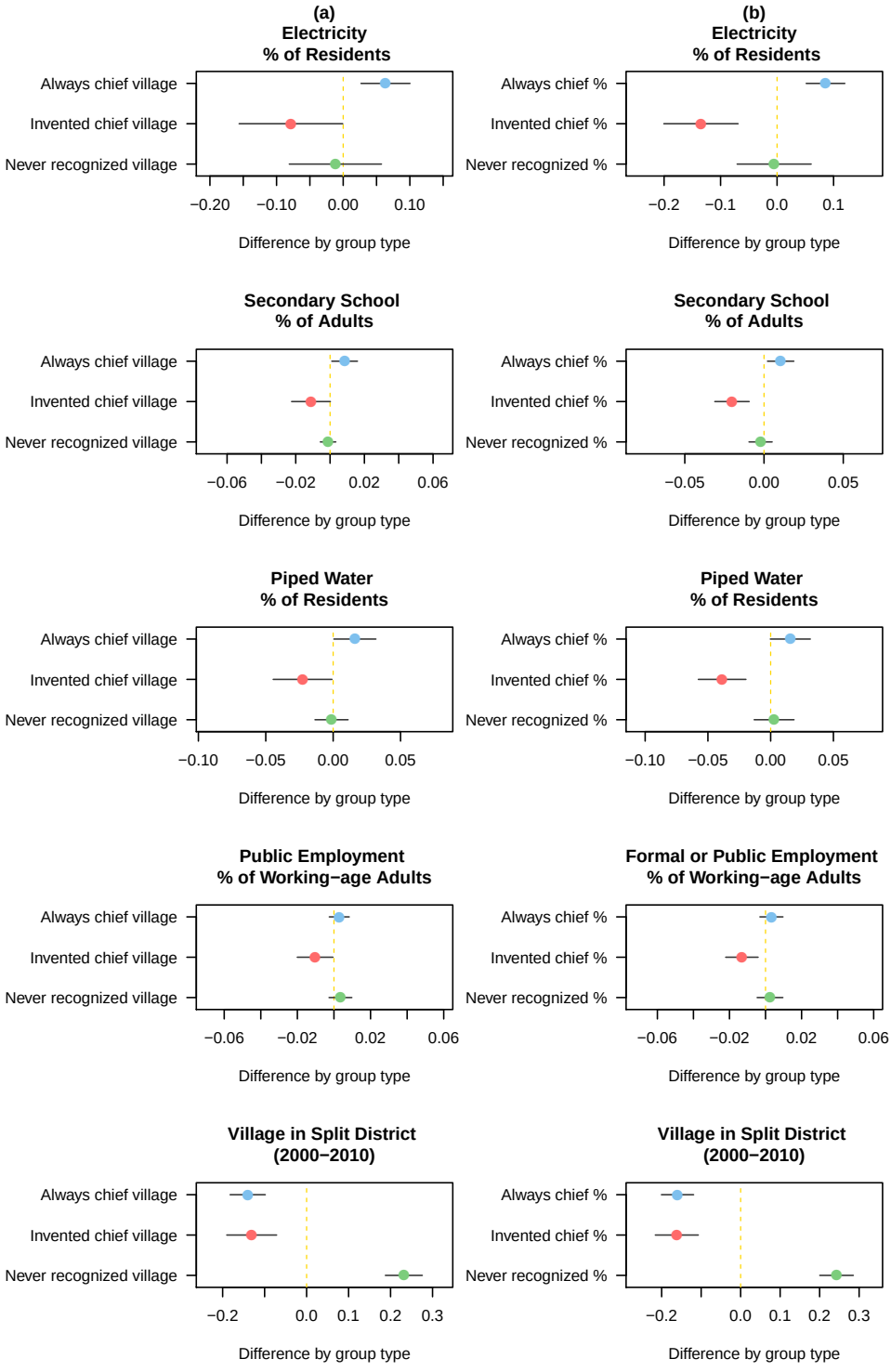

Figure SI.11: *Distribution between 2000 and 2010, by group type, controlling for distance to nearest conflict hot spot.*

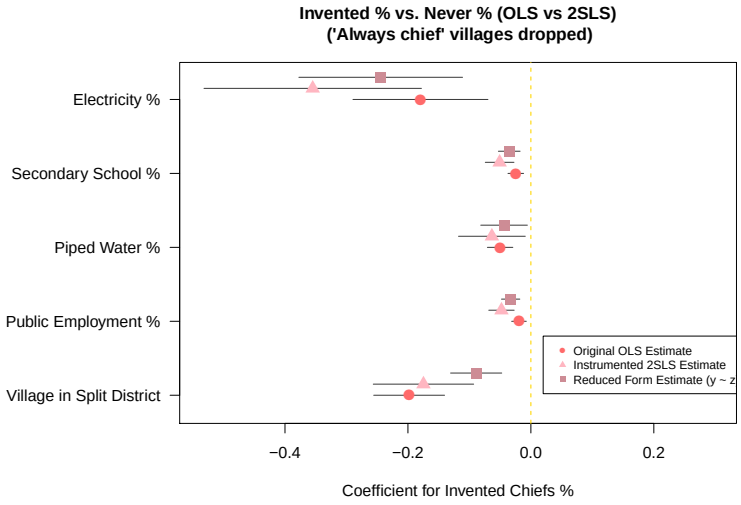

Figure SI.12: *Figure 5 with no control variables*.

12 Instrumental variable models: no control variables

The results in Figure 5 in the main text are robust to excluding the control variables. In the models in Figure SI.12, in addition to the explanatory variable and/or instrumental variable, as applicable, I include only (a) the lagged 2000 outcome and (b) the 2000 district fixed effects. These must remain in the models to keep the quantity of interest being estimated the same: the within-district change over the 2000 level of each resource. But I otherwise drop all other control variables listed in the text. The results are substantively unchanged across all model specifications.

13 Classifications of group locations relative to the pre-1914 border

Pre-colonial centralization is coded primarily from the Murdock (1967) measure of "Levels of Jurisdictional Hierarchy Beyond Local Community," updated for groups that are missing from historical sources.[4] To define the instrument, I mainly rely on historical sources for classifications of groups relative to the 1914 border. Bening (1983), Lentz (2006), and Bening (2010) contain several detailed maps identifying the locations of ethnic groups at the outset of colonial rule. Ladouceur (1979) and Talton (2010) also provide clear textual description of group locations relative to the border. Finally, in the small number of remaining cases where there is no information in historical sources about a group's original location, I use 2010 geo-coded *individual-level* census data. I calculate the geographic centroid of all rural group members. Even if there has been some subsequent

[4]One group – the Dagaba – is coded inaccurately in Murdock (1967).

intra-rural migration, I assume for these few cases that the centroid of the mass of a group's population is unlikely to have very dramatically shifted relative to the border. Reassuringly, none of the centroids among these remaining groups are close to the border at all, such that there are no close calls to make in this process. This results in identifying the following pre-colonially acephalous ethnic groups as having lived entirely on the British side of the border prior to WWI: Dagaba, Frafra (including the Nankani, Talensi, and Gurense), Sisala, Builsa, Namnam, Mo, *Vagala*, *Fulani*, and *Other Grusi groups* (e.g., Templensi, Birifor). I have marked with *italics* the groups on which I relied on the contemporary census data, rather than the historical sources, to make this determination. The other pre-colonially acephalous groups in Table 1 either straddled the Anglo-German border (e.g., the Kusasi), or were entirely on the German side (e.g., the Konkomba, Chokosi, etc).

14 First stage for the IV analysis

Table SI.5 gives first stage OLS estimates of the relationship between the instrument and treatment for the IV models used in Figure 5 in the main text. These are very strongly correlated in each column of Table SI.5. Every 2SLS model also easily passes an F-test for weak instruments.

Table SI.5: First stage OLS for IV analysis

Sample:	Figure 6 (a)	Figure 6 (a)
Instrument for invented chiefs	0.733^{***}	0.614^{***}
	(0.189)	(0.143)
Includes full controls	N	Y
N	2934	2932
R^2	0.580	0.844
adj. R^2	0.580	0.842

† significant at $p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.
The outcome in all models is the population proportion in the enumeration area from a group with invented chiefs.

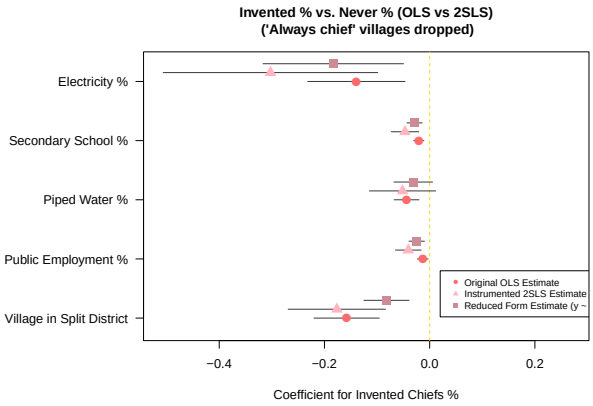

Figure SI.13: *Figure 5 controlling for rainfall, soil quality, and slope*.

15 Controlling for climate, terrain, and soil quality

I validate that any marginal differences in geography and climate cannot explain the results by replicating Figure 5 while controlling for measures of: annual average rainfall (mm/year averaged over 1961-2000); soil quality (an FAO index of suitability for staple grain crops, ranging 0-10000, where 0 is worst and 10000 is best); and ruggedness (slope) (an FAO index ranging from 0-10000 where 0 is flat and 10000 is most mountainous). The new estimates are in Figure SI.13. The data on climate and terrain comes from FAO (2012), which provides highly-localized measures of these features at the level of approximately 9.5km x 9.5km grid cells. The results are unchanged.

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