Econometrica Supplementary Material

SUPPLEMENT TO "HOW IS POWER SHARED IN AFRICA?" (*Econometrica*, Vol. 83, No. 2, March 2015, 465–503)

BY PATRICK FRANCOIS, ILIA RAINER, AND FRANCESCO TREBBI

This supplementary material contains proofs, additional tables and figures, and extensions discussed in the main paper.

APPENDIX A: PROOFS AND EXTENSIONS

A.1. *Proof of Lemma 1*

IN THE TEXT IT IS ALREADY SHOWN THAT

$$V_j^0 = \frac{\delta \varepsilon V_j^{\text{transition}}}{1 - \delta(1-\varepsilon)}. \tag{11}$$

Similarly, $V_j(\Omega^l) = x_j + \delta((1-\varepsilon)V_j(\Omega^l) + \varepsilon V_j^{\text{transition}})$ and $V_j^{\text{leader}}(\Omega^j) = \overline{x}_j + F + \delta((1-\varepsilon)V_j^{\text{leader}}(\Omega^j) + \varepsilon V_j^{\text{transition}})$, so that we can posit $V_j(\Omega^l) = \frac{x_j + \delta\varepsilon V_j^{\text{transition}}}{1-\delta(1-\varepsilon)}$ and $V_j^{\text{leader}}(\Omega^j) = \frac{\overline{x}_j + F + \delta\varepsilon V_j^{\text{transition}}}{1-\delta(1-\varepsilon)}$. Substituting these and V_j^0 defined above into equation (4) yields the level of patronage allocation for group j such that equation (4) just binds as specified in the statement of the lemma:

$$x_j = \gamma(\overline{x}_j + F). \tag{12}$$

A.2. *Proof of Proposition 1*

The proof proceeds in seven steps: Assuming that a stationary, subgame perfect equilibrium exists. We show that necessarily the following statements hold:

1. There exists a "base" group of ethnicities who are included in any government irrespective of the leader's ethnicity.
2. Among members of the base group, larger ethnicities necessarily receive smaller payments per member than smaller ones.
3. No group larger than a group in the base group will be excluded from the base group, implying that the base group comprises the largest groups.
4. We can then construct the optimal composition of the governing coalition for a leader of any ethnicity.
5. Given the optimal composition, we obtain an expression that payments to included non-co-ethnics must satisfy in any stationary subgame perfect equilibrium without coups.
6. We then derive the necessary and sufficient condition on the value of patronage that ensures an equilibrium without coups or revolutions exists.

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7. We then show that the prices supporting the equilibrium and the allocations by ethnicity are unique.

Step 1. Any stationary, subgame perfect equilibrium must consist of a base group of ethnicities who are included irrespective of the leader's ethnicity.

The proof is by contradiction. Posit a hypothetical equilibrium without a base coalition and denote the equilibrium payments to elites of ethnicity j by x_j^e in this hypothetical equilibrium. Moreover, assume that $x_k^e = \inf\{x_1^e \cdots x_N^e\}$. First consider the case when this infimum is unique. With no base ethnicities, there must exist at least one leader $l \neq j$ choosing not to include k in Ω^l. But this implies that Ω^l cannot be optimal, as l excludes an ethnicity who will provide support at a price lower than all other members of the coalition. So a unique $\inf\{x_1^e \cdots x_N^e\}$ is inconsistent with the nonexistence of a base coalition.

Now consider the case where $\inf\{x_1^e \cdots x_N^e\}$ is not unique. There are at least two infima: denote two of these k and j with $x_k^e = x_j^e$. Since there is no base set of ethnicities, there exists at least one leader $l \neq k, j$ who excludes k and another who excludes j in his governing coalition. If not, either k or j would constitute a base set of ethnicities. But then there exists at least one other group m for whom $x_m^e = x_j^e = x_k^e$. Without at least one alternative group m, it would be impossible for leaders to not choose either k or j when choosing their optimal coalition. Applying the same reasoning to group m, nonexistence of a base group requires there to exist a set of groups whose elites sum to a number strictly larger than e^* with equilibrium x^e values equal to the lowest equilibrium payment $\inf\{x_1^e \cdots x_N^e\}$. This must be the case, for a leader from m to choose an ethnicity not included in a leader from l's optimal coalition, so that a base coalition may not exist.

So it remains possible that the per-elite member cost of buying support is identical for all leaders, but comprises differing sets of elite. Denote such per-elite member costs x^e. The total payment of patronage required to buy support is thus $(e^* - e_l)x^e$ for a leader of ethnicity l, implying per period returns of $\frac{1-(e^*-e_l)x^e}{e_l} + F$. But for this to be consistent with equivalent values (x^e) for each leader, m and l, where m denotes the larger of the two so that $e_m = we_l$ and $w > 1$, we must have

$$
\begin{aligned}
x^e \equiv x_l &= \gamma\left(\frac{1-(e^*-e_l)x^e}{e_l} + F\right) = \gamma\left(\frac{1-(e^*-e_m)x^e}{e_m} + F\right) \\
&= x_m \equiv x^e \\
&\implies \quad \frac{1-(e^*-e_l)x^e}{e_l} = \frac{1-(e^*-we_l)x^e}{we_l} \\
&\implies \quad w = 1.
\end{aligned}
$$

But this is a contradiction. Given this, necessarily there must exist a base group of ethnicities included in all leaders' coalitions in any subgame perfect stationary equilibrium.

Step 2. Among members of the base group, larger ethnicities necessarily receive smaller payments per member than smaller ones.

Consider the payments required for members of two distinct elites, j and k in the base group, who are being bought off by the coalition being formed by a leader from group l, denoted Ω^l, and suppose that $e_j > e_k$. Using equation (5) when binding and equation (2), these are given by

$$(13)\qquad x_j e_j = \gamma\left(1 - \sum_{i\neq k, i\in\Omega^j} x_i e_i - x'(j)e'(j) - x_k e_k + e_j F\right),$$
$$x_k e_k = \gamma\left(1 - \sum_{i\neq j, i\in\Omega^k} x_i e_i - x'(k)e'(k) - x_j e_j + e_k F\right).$$

We explicitly denote the split group separately with a'. Since both j and k are in the base coalition, they both have identically comprised governing coalitions: when a j is leader, all elites from k are included and paid x_k; when a k is leader, all elites from j are included and paid x_j. This implies that for the remainder, there is equivalence: $\sum_{i\neq k, i\in\Omega^j} x_i e_i = \sum_{i\neq j, i\in\Omega^k} x_i e_i$. Necessarily then, each leader will have identically sized split groups, comprising the cheapest non-base elites available so that $x'(j)e'(j) = x'(k)e'(k)$. Consequently, subtracting the second from the first equation above leaves

$$(14)\qquad x_j e_j - x_k e_k = \gamma(x_j e_j - x_k e_k) + (e_j - e_k)\gamma F,$$
$$\therefore \frac{(x_j e_j - x_k e_k)}{(e_j - e_k)} = \frac{\gamma F}{(1-\gamma)}.$$

Let $w > 1$ denote the ratio of elite sizes j and k so that $e_j = w e_k$. Using this in (14) yields

$$(15)\qquad x_k = w x_j + \frac{(1-w)\gamma F}{(1-\gamma)}.$$

To prove the claim it is necessary to show that since $e_j > e_k$, necessarily $x_k > x_j$. Using (15), $x_k > x_j$ if and only if

$$w x_j + \frac{(1-w)\gamma F}{(1-\gamma)} > x_j$$
$$\implies \quad \gamma x_j < x_j - \gamma F.$$

But we know from (13) that

$$x_j - \gamma F = \frac{\gamma\left(1 - \sum_{i\neq k, i\in\Omega^j} x_i e_i - x'(j)e'(j) - x_k e_k\right)}{e_j} \equiv \gamma \bar{x}_j.$$

So we need to show that

$$\gamma x_j < \gamma \overline{x}_j.$$

From equation (6), this necessarily holds. Note that we ignore the zero measure parameter configuration where the residual left after paying off all other ethnicities just equals the incentive compatible amount for co-ethnics (i.e., ignoring $x_j e_j = \overline{x}_j e_j$).

Step 3. No ethnic group larger than any member of the base group will be excluded from the base group. Let e^n denote the number of elite in the smallest ethnic group that is a member of the base group. Suppose j is excluded from the base group and that $e^j > e^n$. We can express x_j as

$$x_j = \gamma\left(\frac{1 - (e^* - e_j)\underline{x}}{e_j} + F\right), \tag{16}$$

where $\underline{x}$ is the average payment made by j to a non-co-ethnic member of his coalition. Group n is paid

$$x_n = \gamma\left(\frac{1 - (e^* - e_j)\underline{x} - (e_j - e_n)x'}{e_n} + F\right), \tag{17}$$

where x' denotes the average payment made to the elite of size $(e_j - e_n)$ who are included in addition to the $e^* - e_j$ who are included by j. Note that from (16), the group $(e^* - e_j)$ who were included in j's optimal coalition are hence the cheapest $e^* - e_j$ elite. Since group j is conjectured not to be in the base group, necessarily $x_j > x_n$ otherwise j would be in the base as well as n. This implies necessarily that

$$\gamma\left(\frac{1 - (e^* - e_j)\underline{x}}{e_j} + F\right) > \gamma\left(\frac{1 - (e^* - e_j)\underline{x} - (e_j - e_n)x'}{e_n} + F\right) \tag{18}$$
$$\Longrightarrow \quad (e_j - e_n)(1 - x'e_j) < 0.$$

Now note that $x_j \geq x'$. If not, j would be strictly cheaper than n's marginal included group and would therefore be included instead of that group. We also know that for j to dissuade coups from his own co-ethnics $\overline{x}_j \geq x_j$, which together with the previous inequality implies $\overline{x}_j \geq x'$. Since $(e_j - e_n) > 0$, for inequality (18) to hold necessarily $x'e_j > 1$, which implies $\overline{x}_j e_j > 1$. But then the total value of patronage available to a leader (normalized to 1) is insufficient for a leader from group j to be able to dissuade coups from his own co-ethnic elite. This contradicts the existence of an equilibrium without coups.

Step 4. Since we have shown that the base groups always include the largest ethnic groups, that each leader must recruit at least $e^* = n^*/\lambda$ elite members in his government—including his own elite e_l—to dissuade revolutions, and since $e_1 + \sum_{i=2}^{j^*-2} e_i < e^*$, with e_1 being the largest ethnicity, it then follows that $e_l + \sum_{i=1, i\neq l}^{j^*-2} e_i < e^*$. Moreover, since for any leader $x_j < x_{j+1}$, all leaders will find it optimal to include groups 1 to $j^* - 2$ in their governing coalition, this then is the base group stated in Step 1. To prove the next two statements, we derive the optimal coalition for each leader.

LEMMA 2: *In any equilibrium without coups or revolutions, the optimal governing coalition for a leader of ethnicity l, Ω^l, must satisfy*

$$e \in \Omega^l \equiv \begin{cases} e_1 \cdots e_{j\neq l}, \dots, e_{j^*-1}, e'_{j^*} & \text{for } l \leq j^* - 1, \\ e_1 \cdots e_{j^*-2}, e'_{j*-1}(l) & \text{for } l \in [j^*, j^+], \\ e_1 \cdots e_{j^*-1}, e'_{j^*}(l) & \text{for } l > j^+, \end{cases}$$

where $j^+ < N$ if $\exists j^+ : e^* < \sum_{i=1}^{j^*-1} e_i + e_{j^+}$ and $e^* > \sum_{i=1}^{j^*-1} e_i + e_{j^++1}$, otherwise $j^+ = N$; and where $e'_{j^*} = e^* - \sum_{i=1}^{j^*-1} e_i$ of group j^*, $e'_{j^*-1}(l) = e^* - \sum_{i=1}^{j^*-2} e_i - e_l$ of group $j^* - 1$, and $e'_{j^*}(l) = e^* - \sum_{i=1}^{j^*-1} e_i - e_l$ of group j^*.

PROOF: Since any leader from ethnicity l optimally includes $\sum_{i=1}^{j^*-2} e_i$ in Ω^l, to reach e^* the remaining number to be included is given by

$$e^{\text{gap}}(l) = e^* - \sum_{i=1, i\neq l}^{j^*-2} e_i - e_l.$$

Consider leader $l \leq j^* - 1$. For such a leader, $e^{\text{gap}}(l) = e^* - \sum_{i=1}^{j^*-1} e_i$, since $x_j < x_k$ for $k > j$ and $e_{j^*} > e^{\text{gap}}(l)$ from the definition of j^*. It then follows immediately that the cheapest $e^{\text{gap}}(l)$ elites to include are from group j, thus $e^{\text{gap}}(l) = e'_{j^*} = e^* - \sum_{i=1}^{j^*-1} e_i$ for $l < j^* - 1$.

Consider a leader $l > j^* - 1$. For such a leader, either $e^{\text{gap}}(l) = e^* - \sum_{i=1}^{j^*-1} e_i + e_l < 0$ or $e^* - \sum_{i=1}^{j^*-1} e_i + e_l \geq 0$. Consider the former first: this corresponds to an $l < j^+$, as defined in the statement of the proposition. For such an l,

$$e^{\text{gap}}(l) = e^* - \sum_{i=1}^{j^*-2} e_i - e_l,$$

since including all of the elite from $j - 1$ would exceed e^* and ethnicity $j - 1$ is the cheapest remaining ethnicity not included in the coalition, so the leader optimally sets $e^{\text{gap}}(l) = e'_{j-1}(l) \equiv e^* - \sum_{i=1}^{j^*-2} e_i + e_l$. Now consider the latter, that is, $l \geq j^+ : e^{\text{gap}}(l) = e^* - \sum_{i=1}^{j^*-1} e_i + e_l \geq 0$. By definition, for such a leader, only including ethnicities up to and including $j^* - 1$ in Ω^l is insufficient to achieve

e^* elite. So for such an l,

$$e^{\text{gap}}(l) = e^* - \sum_{i=1}^{j^*-1} e_i - e_l.$$

Clearly, from the definition of j^* in equation (10), $e_{j^*} > e^{\text{gap}}(l) = e^* - \sum_{i=1}^{j^*-1} e_i - e_l$, and since j^* is the cheapest remaining ethnicity not in the included coalition, leader l sets $e'_{j^*} = e^{\text{gap}}(l) = e^* - \sum_{i=1}^{j^*-1} e_i - e_l$.

Finally, note that $j^* \leq j^+$. However, if the smallest ethnicity, e_N, is sufficiently large that $e^* < \sum_{i=1}^{j^*-1} e_i + e_N$, then set $j^+ = N$. *Q.E.D.*

Thus, Step 2 refers to groups j^* and $j^* - 1$. Step 3 refers to groups $j^* + 1, \ldots, N$.

Step 5. Using the optimal composition of each leader's government, we can now derive payments to each group. Define $\widetilde{x}_j \equiv e_j x_j$, so that the system for all groups j in the base coalition is

$$\widetilde{x}_j = \gamma\left(1 - \sum_{i=1, i\neq j}^{j^*-1} \widetilde{x}_i - x_{j^*} e'_{j^*} + e_j F\right), \tag{19}$$

where $e'_{j^*} \equiv e^* - \sum_{i=1}^{j^*-1} e_i$ as defined in Lemma 2. From (14) we know $\widetilde{x}_i = \widetilde{x}_j + \frac{\gamma F}{(1-\gamma)}(e_i - e_j)$. Repeatedly substituting for each i in (19) yields

$$\widetilde{x}_j = \frac{\gamma\left[(1-\gamma)\left(1 - x_{j^*} e'_{j^*}\right) - \gamma F\left(\sum_{i=1}^{j^*-1} e_i\right)\right]}{(1-\gamma)\left[1 + \gamma\left(j^* - 2\right)\right]} + \frac{\gamma F}{(1-\gamma)} e_j.$$

These are the optimal patronage payments to any nonleader group of the base coalition ($j \in [1, j^* - 2]$) in a subgame perfect stationary equilibrium without coups or revolutions, because they are the lowest payments under which loyalty can be guaranteed. It also identifies the payment to group $j = j^* - 1$ whenever it is part of the optimal coalition. Per capita patronage payments are determined by

$$x_j = \frac{\gamma\left[1 - x_{j^*} e'_{j^*} - \frac{\gamma F}{1-\gamma}\left(\sum_{i=1}^{j^*-1} e_i\right)\right]}{1 + \gamma\left(j^* - 2\right)} \frac{1}{e_j} + \frac{\gamma F}{(1-\gamma)}. \tag{20}$$

For group j^* we have

$$x_{j^*} = \gamma\left(\left(1 - \sum_{i=1}^{j^*-2} x_i e_i - e'_{j^*-1}(j^*) x_{j^*-1}\right)\Big/ e_{j^*} + F\right) \quad \text{with}$$

$$e'_{j^*-1}(j^*) = \lambda P\left(1 - r - \sum_{i=1}^{j^*-2} n_i \Big/ P - n_{j^*}/P\right),$$

$$e'_{j^*}(j^*-1) = \lambda P\left(1 - r - \sum_{i=1}^{j^*-2} n_i \Big/ P - n_{j^*-1}/P\right), \quad \text{and}$$

$$x_{j^*-1} = \gamma\left(\left(1 - \sum_{i=1}^{j^*-2} x_i e_i - e'_{j^*}(j^*-1) x_{j^*}\right)\Big/ e_{j^*-1} + F\right).$$

These jointly imply

$$x_{j^*} = \frac{\gamma}{1 - \gamma^2 \dfrac{e'_{j^*}(j^*-1) e'_{j^*-1}(j^*)}{e_{j^*} e_{j^*-1}}} \times \left(\frac{1 - \sum_{i=1}^{j^*-2} x_i e_i}{e_{j^*}}\left(1 - \gamma e'_{j^*-1}(j^*)/e_{j^*-1}\right) + F\left(1 - \gamma e'_{j^*-1}(j^*)/e_{j^*}\right)\right).$$

We can compute $\sum_{i=1}^{j^*-2} x_i e_i$ from (20) such that

$$\sum_{i=1}^{j^*-2} x_i e_i = \frac{\gamma\left[1 - x_{j^*} e'_{j^*}(j^*-1) - \dfrac{\gamma F}{1-\gamma}\sum_{i=1}^{j^*-1} e_i\right]\sum_{i=1}^{j^*-2} e_i}{1 + \gamma(j^*-2)} + \frac{\gamma F(j^*-2)}{1-\gamma}.$$

This implies

$$x_{j^*} = \left(1 - \frac{\gamma\left(1 - \gamma e'_{j^*-1}(j^*)/e_{j^*-1}\right)\dfrac{\gamma}{1+\gamma(j^*-2)}\dfrac{e'_{j^*}(j^*-1)}{e_{j^*}}\sum_{i=1}^{j^*-2} e_i}{1 - \gamma^2 \dfrac{e'_{j^*}(j^*-1) e'_{j^*-1}(j^*)}{e_{j^*} e_{j^*-1}}}\right)^{-1} \times \frac{\gamma}{1 - \gamma^2 \dfrac{e'_{j^*}(j^*-1) e'_{j^*-1}(j^*)}{e_{j^*} e_{j^*-1}}}$$

$$\times\left(\left(1-\frac{\gamma\left[1-\frac{\gamma F}{(1-\gamma)}\sum_{i=1}^{j^*-1}e_i\right]\sum_{i=1}^{j^*-2}e_i}{1+\gamma(j^*-2)}-\frac{\gamma F(j^*-2)}{1-\gamma}\right)\frac{1}{e_{j^*}}\right.$$
$$\left.\times\left(1-\gamma e'_{j^*-1}(j^*)/e_{j^*-1}\right)+F\left(1-\gamma e'_{j^*-1}(j^*)/e_{j^*}\right)\right).$$

Step 6. For existence of an equilibrium without coups or revolutions it is necessary that for a leader randomly drawn from any group, the value of patronage is large enough to ensure that, after equilibrium patronage allocations to non-co-ethnics, sufficient residual patronage remains for elites from the leader's own ethnic group to satisfy (6). Condition (6) implies $\widehat{x}_l \geq \frac{\gamma}{1-\gamma}F$. It is necessary that this holds for a leader from group 1 (the largest) to be able to dissuade coups from 1's own elite. It holding for a leader of group 1 is also sufficient, because we have shown in Step 2 of this proof that, in any such equilibrium, $\widehat{x}_1 < \widehat{x}_i$ for all $i > 1$. Thus, the necessary and sufficient condition for existence is

$$\widehat{x}_1=\frac{\gamma\left[(1-\widehat{x}_{j^*}e'_{j^*})-\frac{\gamma F}{(1-\gamma)}\left(\sum_{i=1}^{j^*-1}e_i\right)\right]}{\left[1+\gamma(j^*-2)\right]}\frac{1}{e_1}+\frac{\gamma F}{(1-\gamma)}\geq\frac{\gamma F}{1-\gamma}.$$

Note that the proposition states that existence is contingent on the concept that "patronage value of government is sufficiently high." Since the patronage value of government posts is normalized to 1, it is not transparent from the preceding equation. If we remove the normalization and state the patronage value of posts as V, then the equation becomes

$$\widehat{x}_1=\frac{\gamma\left[(V-x_{j^*}e'_{j^*})-\frac{\gamma F}{(1-\gamma)}\left(\sum_{i=1}^{j^*-1}e_i\right)\right]}{\left[1+\gamma(j^*-2)\right]}\frac{1}{e_1}\geq 0,$$

which clearly depends positively on V.

Step 7. Uniqueness. We know that our equilibrium set of optimal transfers must satisfy $\widehat{x}$: $\widehat{x}_j e_j = \gamma(1-\sum_{i\in\Omega^j}\widehat{x}_i e_i - x'(j)e'(j)+e_jF)$. Consider an alternative equilibrium denoted by double primes ($''$) and assume without loss of generality that in this equilibrium it happens to be the case that $x''_j > \widehat{x}_j$. It follows from the preceding equality that there must exist at least one coalition member $k\in\Omega_j$ for which $x''_k < x_k$ in this alternative equilibrium. But this immediately violates equation (15). Thus the solution to the set of binding conditions for loyalty of non-co-ethnics in the statement of the proposition is unique.

Since the solution to the set of equations (5) is unique and these equations determine the payments in any equilibria consisting of a base set of ethnicities chosen by any leader, the optimal coalitions defined in Lemma 2 will also apply whenever there exists a base set of ethnicities included in all governing coalitions. An alternative equilibrium set of payments and optimal coalition can only arise were there to be equilibria where there does not exist a base set of ethnicities chosen by all leaders. We have already shown in Step 1 that this cannot occur.

A.3. *Proof of Proposition 2*

Statement (i). This was proved in Step 2 of the proof of Proposition 1.

Statement (ii). Since $\gamma < 1$, the right-hand side (RHS) of (14) is greater than 0 if and only if $F > 0$. Since $e_j > e_k$, it then follows directly that $(x_j e_j - x_k e_k) > 0$ if and only if $F > 0$, thus proving the statement.

Statement (iii). Consider the leadership premia accruing to members of two distinct elites, j and $k \in \mathcal{C}$, in case the leader belongs to their groups respectively and suppose that $e_j > e_k$:

$$\begin{aligned} &\left(1 - \sum_{i \in \Omega^j} x_i e_i - x'(j)e'(j)\right) - x_j e_j = \text{premium}_j, \\ &\left(1 - \sum_{i \in \Omega^k} x_i e_i - x'(k)e'(k)\right) - x_k e_k = \text{premium}_k. \end{aligned} \tag{21}$$

We can rewrite (21) as

$$\begin{aligned} &\left(1 - \sum_{i \neq k, i \in \Omega^j} x_i e_i - x_k e_k - x'(j)e'(j)\right) - x_j e_j = \text{premium}_j, \\ &\left(1 - \sum_{i \neq j, i \in \Omega^k} x_i e_i - x_j e_j - x'(k)e'(k)\right) - x_k e_k = \text{premium}_k, \end{aligned}$$

and noticing that $\sum_{i \neq k, i \in \Omega^j} x_i e_i - x'(j)e'(j) = \sum_{i \neq j, i \in \Omega^k} x_i e_i - x'(k)e'(k)$, as both are in the base group, this implies $\text{premium}_j = \text{premium}_k$.

A.4. *Generalization of Contest Function to Allow for Fractionalization to Impede Effectiveness*

If the insider forces include groups $i \in \mathcal{N}_I \subset \mathcal{N}$ and outsider forces include $i \in \mathcal{N}_O \subset \mathcal{N}$, then a more general specification of the contest function allowing for the composition of forces to potentially affect the success probability of a contesting force is $\frac{\sum_{i \in \mathcal{N}_O} n_i^\chi}{\sum_{i \in \mathcal{N}_O} n_i^\chi + \sum_{i \in \mathcal{N}_I} n_i^\chi}$, which corresponds with our linear specification when $\chi = 1$.

A.5. *No Revolutions Along the Equilibrium Path Condition*

If (3) fails, then the indicator variable $\Re(\Omega) = 1$ always, so that the government faces a constant revolution. We thus have

$$W_l(\Omega) = \psi \frac{\sum_{i \notin \Omega^l} n_i}{P} + V_l^{\text{leader}}(\Omega) \times \left(1 - \frac{\sum_{i \notin \Omega^l} n_i}{P}\right).$$

A sufficient condition to rule out constant revolutions is that it is not worthwhile for the leader to tolerate such revolutions from even the smallest group of outsiders, n_N. This group represents the lowest chance of revolution success, so a leader unwilling to bear this risk, will not bear it from any larger excluded group. Let Ω' denote the coalition formed by including all groups $i \neq N$. Thus we have as a sufficient condition for no revolutions along the equilibrium path:

$$\psi \frac{n_N}{P} + V_l^{\text{leader}}(\Omega') \times \left(1 - \frac{n_n}{P}\right) < V_l^{\text{leader}}(\Omega).$$

This is satisfied for sufficiently low ψ, and we assume that ψ is sufficiently low so that this condition never binds.

A.6. *No Coups Along the Equilibrium Path Condition*

We now derive and discuss a sufficient condition for the leader's choice to completely ensure against coups.

Under x_j, solving (4) it is never worthwhile for an elite included in the coalition to exercise a coup option. The body of the paper proceeds under the assumption that the leader will choose to give transfers solving (4). But an alternative is for the leader to include elites from a group so that it would not join a revolution against the leader, but still exercise a coup option if one arose. Under this option, the x_j given to it can be lower; denote it by x_j'. This x_j' must be high enough so that elite from this group j do not wish to unilaterally trigger a revolution. This is solved as follows. Let $V_j'(\Omega^l)$ denote the value to a member of group j in leader l's coalition if he is receiving $x_j' < x_j$. The amount that is just sufficient to stop a member of j from forming a coalition against the leader is given by

$$\left(\frac{\sum_{i \notin \Omega^l} n_i + n_j}{P}\right) r V_j^{\text{transition}} + \left(1 - \frac{\sum_{i \notin \Omega^l} n_i + n_j}{P}\right) r V_j^0 = V_j'(\Omega^l).$$

Since $V_j'(\Omega^l) = \frac{x_j' + \delta\varepsilon V^{\text{transition}}}{1-\delta(1-\varepsilon)}$ and $V_j^0 = \frac{0+\delta\varepsilon V^{\text{transition}}}{1-\delta(1-\varepsilon)}$, this implies

$$x_j' = V_j^{\text{transition}}\left[\big(1-\delta(1-\varepsilon)\big)\left(\frac{\sum_{i\notin\Omega^l} n_i + n_j}{P}\right)r + \left(1 - \frac{\sum_{i\notin\Omega^l} n_i + n_j}{P}\right)r\delta\varepsilon - \delta\varepsilon\right].$$

The trade-off faced by the leader is between saving patronage allocation $(x_j - x_j')\frac{e_j}{e_l}$ and facing a possible coup if the opportunity arises for any member of group j. Notice that the trade-off is in theory ambiguous with respect to which size group should be paid below x_j. A large group allows large savings, but it is also a more likely source of coups.

Similarly to the case of revolutions, we assume there is a personal cost $\omega > 0$ associated with the leader falling victim of a coup (independently of winning or losing, as for revolutions). A sufficiently high loss ω will rule out any leader willingness to chance a coup. The condition for the leader to exclude coups from group j is

$$\begin{aligned}
&\overline{x}_l + \delta\big((1-\varepsilon)V_l^{\text{leader}}\big(\Omega^l\big) + \varepsilon V_l^{\text{transition}}\big)\\
&\quad\geq \left(1 - \gamma\frac{e_j}{\sum_{i\in\Omega^l} e_i}\right)\\
&\qquad\times\left(\overline{x}_l + \frac{e_j}{e_l}\big(x_j - x_j'\big) + F + \delta\big((1-\varepsilon)V_l^{\text{leader}}\big(\Omega^l\big) + \varepsilon V_l^{\text{transition}}\big)\right)\\
&\qquad+ \gamma\frac{e_j}{\sum_{i\in\Omega^l} e_i}\big(-\omega + \delta\big((1-\varepsilon)V_l^{\text{loss}} + \varepsilon V_l^{\text{transition}}\big)\big).
\end{aligned}$$

Notice that this condition is monotonic in the loss ω; hence there is always a sufficiently high cost of a coup so that the leader chooses to fully insure against it.

The rationale behind this sufficient condition is parsimony in the number of model parameters to be estimated from the data. The advantage of this treatment is that since cost ω is not incurred on the equilibrium path and we assume it is large enough so that the leader's no coup condition never binds, ω will not enter into the estimating equations.

A.7. *Explicit Form of* $V_j^{\text{transition}}$

The value of being in the transition state is

$$V_j^{\text{transition}} = p_j(\mathbf{N})\overline{V}_j(\Omega^j) + \sum_{l=1, l\neq j}^{N} p_l(\mathbf{N})\big[I(j\in\Omega^l)V_j(\Omega^l) + \big(1 - I(j\in\Omega^l)\big)V_j^0\big], \tag{22}$$

where $I(\cdot)$ is the indicator function denoting a member of j being in leader l's optimal coalition.[43] Notice that we ignore here the small probability event that individual j actually becomes the leader after a transition. It can be included without effect. The interpretation of equation (22) is that after an exogenous shock that terminates the current leader, j can either become a member of the ruling coalition of a co-ethnic of his, with probability $p_j(\mathbf{N})$ or, with probability $p_l(\mathbf{N})$, obtain value $V_j(\Omega^l)$ under the leader of ethnicity l if included or V_j^0 if excluded.

Recall that this value function depends on the probability of an elite in j being selected into a governing coalition by a new leader that we can, using Proposition 1, define.

The state $V_j^{\text{transition}}$ varies depending on whether an ethnicity is in the base group of larger ethnicities (and thus always included in the leader's optimal coalitions), or a smaller group (whose inclusion in government only arises when one of their own is the leader), or one of the groups j^* and j^*-1 (whose inclusion in government depends on the size of the particular leader's ethnicity at the time). Specifically, from Proposition 1 it follows that:
for $j < j^* - 1$,

$$V_j^{\text{transition}} = p_j(\mathbf{N})\overline{V}_j(\Omega^j) + \big(1 - p_j(\mathbf{N})\big)V_j(\Omega^l);$$

for $j = j^* - 1$,

$$V_{j^*-1}^{\text{transition}} = p_{j^*-1}(\mathbf{N})\overline{V}_{j^*-1}(\Omega^{j^*-1}) + \sum_{l=1, l\neq[j^*, j^+]}^{N} p_l(\mathbf{N})V_{j^*-1}(\Omega^l) + \sum_{l=j^*}^{j^+} p_l(\mathbf{N})\left(\frac{e'_{j^*-1}(l)}{e_{j^*-1}}V_{j^*-1}(\Omega^l) + \left(1 - \frac{e'_{j^*-1}(l)}{e_{j^*-1}}\right)V_{j^*-1}^0\right);$$

[43] We slightly abuse notation by not considering that individuals of group j could potentially suffer a different destiny in case the group were split. We precisely characterize this when we explicitly represent $V_j^{\text{transition}}$ below.

for $j = j^*$,

$$V_{j^*}^{\text{transition}} = p_{j^*}(\mathbf{N})\overline{V}_{j^*}\big(\Omega^{j^*}\big) + \sum_{l=1}^{j^*-1} p_l(\mathbf{N})\left(\frac{e'_{j^*}}{e_{j^*}}V_{j^*}\big(\Omega^l\big) + \left(1 - \frac{e'_{j^*}}{e_{j^*}}\right)V_{j^*}^0\right)$$
$$+ \sum_{l=j^+}^{N} p_l(\mathbf{N})\left(\frac{e'_{j^*}(l)}{e_{j^*}}V_{j^*}\big(\Omega^l\big) + \left(1 - \frac{e'_{j^*}(l)}{e_{j^*}}\right)V_{j^*}^0\right)$$
$$+ \sum_{l=j^*+1}^{j^+-1} p_l(\mathbf{N})V_{j^*}^0;$$

for $j > j^*$,

$$V_j^{\text{transition}} = p_j(\mathbf{N})\overline{V}_j\big(\Omega^j\big) + \big(1 - p_j(\mathbf{N})\big)V_j^0.$$

A.8. *Theory Extension: Elite–Non-Elite Divisions*

A final issue worth addressing concerns the clientelistic microfoundations of the within-ethnic-group organization.[44] In this section, we answer the following questions: Why do non-elites support a leader who allocates a patronage position to their representative elite? How much of the value generated by such a patronage position does an elite keep and how much does he have to share with his non-elite? Why do elites have incentives to organize their non-elites in support of a leader?

We define the patronage value of a government post (i.e., the dollar amount that a minister gets from controlling appointments, apportionment, and acquisitions in his ministry) as V. In Section 2, V was normalized to 1, but we will keep it unnormalized here to focus on its explicit division between elite and non-elite. An elite member controlling x government posts controls a flow of resources xV. We still assume x is continuous and abstract from the discreteness of post allocations.

Assume the use value of a government post to a member of the non-elite is U in total if it is controlled by their own elite. If my group controls a ministry, I benefit by being more likely to be able to get benefits from this ministry. If it is

[44]We follow the intuition in Jackson and Rosberg (1982, p. 40): "The arrangements by which regimes of personal rule are able to secure a modicum of stability and predictability have come to be spoken of as 'clientilism'.... The image of clientilism is one of extensive patron–client ties. The substance and the conditions of such ties can be conceived of as the intermingling of two factors: first, the resources of patronage (and the interests in such resources, which can be used to satisfy wants and needs) may be regarded as the motivation for the personal contracts and agreements of which patron–client ties consist; and second the loyalty which transcends mere interests and is the social 'cement' that permits such ties to endure in the face of resource fluctuations. Both of these factors are important as an explanation for some of the stable elements in African personal rule."

education, for instance, my children will be more likely to access good schools. If it is public works, our people will be more likely to get jobs in the sector and the benefits of good infrastructure. If it is the army, our men will be more likely to get commands. An empirical illustration of this logic for road building in Kenya is given by Burgess, Jedwaby, Miguel, Morjaria, and Padro i Miquel (2011).

The use value of a post to the non-elite if it is controlled by someone else is ϕU. Let $\phi \leq 1$ be related to the degree of ethnic harmony. If $\phi = 1$, non-elites do not care about the identity of the minister; they get as much out of the ministry no matter who controls it. If $\phi = 0$, society is extremely ethnically polarized. A ministry controlled by someone else is of no use to me.

A.9. *Theory Extension: Nash Bargaining*

The elite obtain posts in return for delivering support. The non-elites give support in return for having the control of posts in the hands of their own ethnic elites. We assume that these two parties bargain over the allocation of the patronage value of the posts that the elite receive from the leader, xV. We also assume that they can commit to agreements ex ante. That is, if the non-elites withdraw support, a post will revert to some other ethnic elite member, with the consequent loss of value $(1-\phi)xU$ for them. If the elite loses the patronage value of the post, he loses xV. This implies a Nash bargain, with κ denoting the share of V going to the elite, given as

$$\max_{\kappa}\left\{\left(\frac{\kappa xV - 0}{1}\right)\left(\frac{(1-\kappa)xV + (1-\phi)xU}{1/\lambda}\right)\right\}$$

and implying that $\kappa = \frac{1+(1-\phi)U}{2V}$, so the value to an elite of controlling x posts is

$$\kappa V x = \frac{1+(1-\phi)U}{2}x.$$

This result has several important implications. First of all, the greater is the degree of ethnic tension in a country (i.e., the lower ϕ), the greater is the share of the value going to the elite of each group. Clearly, ethnic group leaders have an incentive to incite ethnic tensions in this setting in a fashion similar to Padro i Miquel (2007). High levels of ethnic tensions can produce substantial inequality between the elite and the non-elite of ethnic groups. Second, the larger is the use value of a government post to a member of the non-elite, U, the greater is the share of the value going to the elite of each group.

Finally, suppose that the cost to an elite of organizing his $1/\lambda$ non-elite in support of the leader are $c \geq 0$. For an elite from ethnicity j receiving x_j posts for participating in the government to be willing to participate in the government, we have the individual rationality constraint

$$\kappa V x_j = \frac{1+(1-\phi)U}{2}x_j \geq c.$$

This must be satisfied for all groups in government. Let $x^{\mathrm{IR}} \equiv c/\frac{1+(1-\phi)U}{2}$. Since x_j is smaller for larger groups, it implies that if there exist some groups for whom $x_j < x^{\mathrm{IR}}$, then these will be paid x^{IR}. This does not upset the ordering determined in Section 2, but does require a recalculation of the equilibrium patronage values. More interestingly, κ does affect the share of post values accruing to the elite members, but does not affect the total number of posts elites must receive from the leader unless the participation constraint binds. Hence, particularly if ϕ affects ε adversely, country leaders will have strictly lower incentives to incite ethnic tension than ethnic group elites have. It is important to underscore the asymmetry between the incentives of leaders and ethnic group elites along this dimension.

A.10. *Empirical Extension: Counterfactuals Under the 1956 Togoland and 1961 Cameroons Referenda*

Table B.VI reports a counterfactual reduction of 1% of the population to any group above the median group size, while adding 1% to any group below the median in each country.[45] This counterfactual increases ethnic fractionalization (Alesina, Devleeshauwer, Easterly, Kurlat, and Wacziarg (2003), Fearon (2003)) and unambiguously strengthens small groups on the outside of the government and weakens government insiders. Population share shifting is of course not a policy variable today, but it was exactly this that was being decided at the time of independence. We can examine counterfactual partitions that would have arisen via the referenda administered by departing colonists and use the model to examine the counterfactual ministerial allocations implied. A first experiment is run with respect to the 1961 referenda in the British Cameroons. The Northern Cameroons opted for annexation to Nigeria versus the alternative, which the Southern Cameroons selected, of annexation to Cameroon. Table B.VI reports the counterfactual coalitions under all possible alternatives. In both of these cases, the referenda outcomes ended up offsetting the strength of the largest and leader's groups. That is, the leader's group and the largest groups would both have gotten a larger share in both Cameroon and Nigeria had the two Cameroons gone to the other than chosen country instead. Both groups opted to move in ways that diluted numerical strength in a single country, essentially spreading themselves more evenly rather than concentrating.[46] In the 1956 Togoland referendum, the people of British Togoland were

[45]The specific effect of ethnic fractionalization (ELF) on post allocations needs to be studied on an case-by-case basis within our framework. The reason is that there are multiple ways an ethnic group distribution $\mathbf{N} = \{n_1, \dots, n_N\}$ can be modified to increase ELF. Carefully shifting mass across groups may produce no change in the balance of strength between insiders and outsiders, while still increasing ELF. This ambiguity is the result of the large amount of degrees of freedom allowed when the full vector of group sizes $\mathbf{N}$ is modified. The example in the text clarifies how our model captures distributional changes in a straightforward case.

[46]For Cameroon, only the Fulani and the Fang ever lead. Excluding Southern Cameroon, the Fulanis' share would have increased from 9 to 10.68%, while increasing the Fang's share from 19

asked to decide whether they wanted to join Ghana (then Gold Coast, which they did) or Togo. Again the referendum's outcome was against concentration and thus tended to compress seat shares of both the largest and the leader's groups. For instance, in the counterfactual, Togo's largest group (Ewe) would have had a boost in size with the annexation of Togoland (from 22 to 27.3%) and the model predicts an induced increase in the largest group share (from 23.5 to 27.4%). At least for large groups, the tendency toward dilution in both referenda appears to be consistent with diminishing returns to group size as we have precisely indicated above.

APPENDIX B: ADDITIONAL TABLES

TABLE B.I

ELITE INCLUSIVENESS AND DISPROPORTIONALITY IN AFRICA[a]

Country	Average Share of the Population Not Represented in Government	Disproportionality Mean
Benin	28.23	16.59
Cameroon	17.64	11.35
Cote d'Ivoire	13.93	13.48
Congo, Dem. Rep.	28.17	12.96
Gabon	13.72	15.64
Ghana	29.84	16.39
Guinea	7.54	16.6
Kenya	9.21	11.06
Liberia	50.38	38.01
Nigeria	12.02	14.24
Rep. of Congo	11.13	19.62
Sierra Leone	15.92	17.03
Tanzania	42.87	16.06
Togo	31.95	17.43
Uganda	27.91	14.32
Average	*22.7*	*16.72*

[a]Time averages over post-independence to 2004. Gallagher (1991) least squares disproportionality measure reported.

to 23.26%. The Fang are also the largest group in both cases. The increases in both the leaders' group shares (from 22.5 to 25.5%) and largest group shares (from 23.1 to 27.3%) would have followed from the groups becoming relatively larger (with the coalitions being about the same size). For Nigeria, the largest group is always the Hausa and their share would have increased a little had both groups joined Cameroon. Interestingly and symmetrically, Table B.VI also shows a dilution effect in the case of a country joined by both Cameroons.

TABLE B.II

TOP CABINET POSTS ONLY: MAXIMUM LIKELIHOOD ESTIMATES[a]

α	11.5 (1.4)						
ε	0.115 (0.012)						
δ	0.95						
Country	ζ	r	γ	F	$\log LL$	Slope: $F\gamma/(1-\gamma)$	Leadership Premium
Benin	18.6 (2.1)	0.821 (0.016)	0.350 (0.180)	2.00 (2.10)	209.9855	1.06 (0.31)	0.282 (0.030)
Cameroon	40.1 (3.9)	0.837 (0.014)	0.443 (0.067)	0.27 (0.41)	259.4370	0.22 (0.27)	0.312 (0.018)
Congo, Dem. Rep.	29.3 (2.9)	0.853 (0.014)	0.053 (0.056)	20.40 (25.50)	485.2384	1.13 (0.15)	0.207 (0.028)
Cote d'Ivoire	22.9 (2.9)	0.910 (0.015)	0.116 (0.041)	1.59 (2.21)	281.0537	0.21 (0.21)	0.436 (0.031)
Gabon	18.9 (2.1)	0.815 (0.017)	5.6e−13 (0.33)	2.5e+12 (1.6e+24)	57.2651	1.44 (0.34)	0.347 (0.026)
Ghana	10.4 (1.0)	0.816 (0.016)	0.290 (0.180)	1.36 (2.91)	488.0237	0.57 (0.74)	0.346 (0.044)
Guinea	25.9 (2.9)	0.919 (0.008)	0.405 (0.079)	0.43 (0.32)	19.3376	0.30 (0.13)	0.293 (0.026)
Kenya	23.4 (2.5)	0.907 (0.016)	6.2e−15 (0.004)	6.0e+14 (1.1e+26)	152.3001	0.99 (0.06)	0.282 (0.023)
Liberia	10.8 (1.6)	1.000 (0.023)	0.071 (0.029)	−3.01 (1.3e−5)	282.3815	−0.23 (0.10)	0.572 (0.074)
Nigeria	27.6 (2.7)	0.9218 (0.0085)	0.275 (0.071)	1.47 (0.83)	180.0479	0.56 (0.13)	0.209 (0.033)
Rep. of Congo	19.7 (2.2)	0.9057 (0.0093)	0.583 (0.058)	−0.48 (0.10)	75.7406	−0.67 (0.22)	0.319 (0.028)
Sierra Leone	16.6 (1.3)	0.897 (0.012)	0.360 (0.100)	1.35 (0.79)	205.9451	0.68 (0.14)	0.223 (0.037)
Tanzania	43.0 (4.0)	0.876 (0.012)	0.249 (0.042)	0.18 (0.55)	403.8598	0.06 (0.17)	0.152 (0.020)
Togo	15.8 (2.1)	0.836 (0.014)	0.411 (0.082)	0.36 (0.45)	382.4744	0.25 (0.25)	0.341 (0.030)
Uganda	24.5 (2.5)	0.832 (0.015)	9.8e−14 (0.03)	1.5e+13 (4.7e+24)	439.4047	1.48 (0.09)	0.243 (0.026)

[a] Asymptotic standard errors are given in parentheses. The $\log LL$ reported is specific to the contribution of each country. An insider constraint considering a unilateral deviation of a coalition member into staging a revolution from the inside is verified in all countries (excluding Liberia).

TABLE B.III

FULL CABINET WITH COORDINATION COSTS χ: MAXIMUM LIKELIHOOD ESTIMATES[a]

α	11.5					
	(1.4)					
ε	0.115					
	(0.012)					
δ	0.95					
Country	ζ	r	χ	γ	F	$\log LL$
Benin	63.0	0.688	0.9900	0.980	0.04	110.2642
	(4.4)	(0.021)	(0.2000)	(0.070)	(0.14)	
Cameroon	261.2	0.690	0.9793	1.0e−12	9.1e+11	596.5894
	(15.3)	(0.022)	(0.0036)	(0.018)	(1.5e+22)	
Congo, Dem. Rep.	179.0	0.688	0.9914	0.196	4.13	514.6929
	(10.3)	(0.022)	(0.0035)	(0.035)	(1.04)	
Cote d'Ivoire	167.1	0.699	0.9422	0.322	0.93	417.0135
	(11.7)	(0.022)	(0.0015)	(0.024)	(0.24)	
Gabon	103.4	0.692	0.9703	0.625	0.69	258.2892
	(7.3)	(0.022)	(0.0018)	(0.065)	(0.20)	
Ghana	95.7	0.711	0.8887	1.00	1.3e−09	180.2492
	(5.1)	(0.024)	(0.0013)	(0.19)	(0.36)	
Guinea	127.7	0.6940	0.966	0.064	10.2	272.2668
	(10.5)	(0.022)	(0.015)	(0.025)	(4.7)	
Kenya	249.2	0.690	0.9851	0.074	10.9	563.5996
	(14.9)	(0.022)	(0.0024)	(0.037)	(6.4)	
Liberia	24.2	0.696	0.9539	0.083	−1.1	−73.5255
	(1.5)	(0.023)	(0.0044)	(0.027)	(1.6)	
Nigeria	140.0	0.686	0.9996	0.385	1.03	521.5482
	(7.4)	(0.022)	(0.0003)	(0.047)	(0.24)	
Rep. of Congo	76.0	0.684	1.0104	0.498	−1.5e−04	261.4404
	(5.2)	(0.022)	(0.0008)	(0.034)	(0.086)	
Sierra Leone	70.1	0.712	0.8840	0.454	0.64	186.1629
	(5.4)	(0.021)	(0.0310)	(0.043)	(0.16)	
Tanzania	147.5	0.688	0.9911	0.120	4.4	347.6090
	(7.3)	(0.022)	(0.0017)	(0.042)	(2.4)	
Togo	58.7	0.706	0.9103	0.537	0.36	63.0554
	(4.6)	(0.021)	(0.0042)	(0.046)	(0.17)	
Uganda	135.7	0.692	0.9706	1.000	1.2e−10	276.7344
	(9.1)	(0.021)	(0.0082)	(0.280)	(0.48)	

[a]Asymptotic standard errors are given in parentheses. The $\log LL$ reported is specific to the contribution of each country. An insider constraint considering a unilateral deviation of a coalition member into staging a revolution from the inside is verified in all countries (excluding Liberia).

TABLE B.IV

COLD WAR[a]

	1960–1990	1991–2004			
α	12.21	8.73			
	(1.80)	(1.80)			
ε	0.116	0.16			
	(0.017)	(0.031)			
δ	0.95	0.95			
Country	ζ	r	γ	F	$\log LL$
$\text{Benin}_{1960\text{–}1990}$	51.8	0.902	1.000	0.000	−31.5511
	(5.2)	(0.017)	(0.266)	(0.550)	
$\text{Benin}_{1991\text{–}2004}$	120.3	0.924	9.0e−13	1.4e+12	−93.2221
	(20.5)	(0.014)	(0.11)	(1.6e+23)	
$\text{Cameroon}_{1960\text{–}1990}$	213.7	0.969	2.2e−10	1.0e+09	−280.8089
	(17.2)	(0.008)	(0.05)	(1.0e+18)	
$\text{Cameroon}_{1991\text{–}2004}$	394	0.984	0.008	105	−326.7293
	(33.8)	(0.006)	(0.020)	(256)	
$\text{Congo, Dem. Rep.}_{1960\text{–}1990}$	188.2	0.865	0.249	3.19	−364.0717
	(13.2)	(0.017)	(0.039)	(0.77)	
$\text{Congo, Dem. Rep.}_{1991\text{–}2004}$	169.0	0.915	0.324	1.45	−165.5162
	(16.6)	(0.015)	(0.064)	(0.53)	
$\text{Cote d'Ivoire}_{1960\text{–}1990}$	196.3	0.909	0.348	−0.02	−263.3758
	(17.1)	(0.011)	(0.014)	(0.21)	
$\text{Cote d'Ivoire}_{1991\text{–}2004}$	197.3	0.957	0.489	0.28	−181.6251
	(26.4)	(0.008)	(0.066)	(0.15)	
$\text{Gabon}_{1960\text{–}1990}$	72.4	0.9847	1.1e−13	8.0e+12	−143.5440
	(7.4)	(0.0091)	(0.015)	(1.1e+24)	
$\text{Gabon}_{1991\text{–}2004}$	80.8	0.989	0.2	3.48	−60.2497
	(21.5)	(0.010)	(0.31)	(6.92)	
$\text{Ghana}_{1960\text{–}1990}$	70.2	0.853	0.59	1.0	−61.428
	(5.3)	(0.019)	(0.52)	(2.2)	
$\text{Ghana}_{1991\text{–}2004}$	106.0	0.892	0.89	0.15	−93.5278
	(11.0)	(0.019)	(0.40)	(0.61)	
$\text{Guinea}_{1960\text{–}1990}$	110.0	0.922	0.510	0.38	−160.1232
	(15.1)	(0.010)	(0.042)	(0.12)	
$\text{Guinea}_{1991\text{–}2004}$	233.6	0.989	0.209	2.03	−138.0594
	(36.5)	(0.003)	(0.033)	(0.53)	
$\text{Kenya}_{1960\text{–}1990}$	375.6	0.963	1.1e−13	2.4e+11	−398.4432
	(35.7)	(0.007)	(0.04)	(2.4e+21)	
$\text{Kenya}_{1991\text{–}2004}$	208.1	0.978	0.236	1.57	−204.2325
	(25.2)	(0.006)	(0.040)	(0.50)	

(*Continues*)

TABLE B.IV—*Continued*

	1960–1990	1991–2004			
α	12.21	8.73			
	(1.80)	(1.80)			
ε	0.116	0.16			
	(0.017)	(0.031)			
δ	0.95	0.95			
Country	ζ	r	γ	F	$\log LL$
$\text{Liberia}_{1960–1990}$	22.1	0.892	0.165	−2.7	87.2145
	(2.3)	(0.016)	(0.044)	(0.8)	
$\text{Liberia}_{1991–2004}$	62.3	0.950	0.39	−1.1	−67.2211
	(6.6)	(0.011)	(0.09)	(0.16)	
$\text{Nigeria}_{1960–1990}$	109.9	0.959	0.405	0.88	−297.3168
	(7.6)	(0.007)	(0.060)	(0.26)	
$\text{Nigeria}_{1991–2004}$	348.2	0.989	0.18	3.6	−236.0749
	(27.9)	(0.004)	(0.06)	(1.6)	
$\text{Rep. of Congo}_{1960–1990}$	94.8	0.933	0.454	−0.325	−185.5364
	(7.5)	(0.010)	(0.025)	(0.088)	
$\text{Rep. of Congo}_{1991-2004}$	88.4	0.907	0.948	−0.05	−106.5905
	(14.0)	(0.017)	(0.049)	(0.04)	
$\text{Sierra Leone}_{1960-1990}$	68.5	0.902	0.661	0.157	−101.4894
	(6.1)	(0.013)	(0.053)	(0.042)	
$\text{Sierra Leone}_{1991–2004}$	115.9	0.963	0.172	2.9	−100.9483
	(16.0)	(0.008)	(0.040)	(1.0)	
$\text{Tanzania}_{1960–1990}$	115.4	0.874	0.397	0.45	−162.6691
	(8.3)	(0.017)	(0.075)	(0.34)	
$\text{Tanzania}_{1991–2004}$	199.8	0.980	0.18	3.3	−189.6430
	(23.1)	(0.007)	(0.12)	(3.1)	
$\text{Togo}_{1960–1990}$	45.0	0.840	0.57	0.26	38.2341
	(4.6)	(0.020)	(0.08)	(0.23)	
$\text{Togo}_{1991–2004}$	154.9	0.969	0.13	6.4	−132.5912
	(21.7)	(0.009)	(0.11)	(6.4)	
$\text{Uganda}_{1960–1990}$	161.5	0.932	4.5e−13	1.0e+12	−272.5018
	(11.6)	(0.010)	(0.021)	(1.0e+23)	
$\text{Uganda}_{1991–2004}$	167.0	0.901	1.0000	6.5e−13	−49.5078
	(21.0)	(0.018)	(0.0001)	(2.3e−4)	

[a]Asymptotic standard errors are given in parentheses. The $\log LL$ reported is specific to the contribution of each country. An insider constraint considering a unilateral deviation of a coalition member into staging a revolution from the inside is verified in all countries (excluding Liberia).

TABLE B.V
WESTERN AFRICA AND FRANCE[a]

	1960–1993	1994–2004			
α	11.53 (1.60)	9.17 (1.90)			
ε	0.114 (0.015)	0.171 (0.040)			
δ	0.95	0.95			
Country	ζ	r	γ	F	$\log LL$
$\text{Benin}_{1960–1993}$	55.1 (5.1)	0.899 (0.015)	1.000 (0.234)	0.000 (0.500)	−49.6304
$\text{Benin}_{1994–2004}$	124.5 (23.8)	0.932 (0.016)	0.02 (0.36)	78.4 (1927)	−73.7724
$\text{Cameroon}_{1960–1993}$	225.1 (16.7)	0.969 (0.007)	3.8e−13 (0.010)	2.6e+12 (6.9e+22)	−338.3467
$\text{Cameroon}_{1994–2004}$	417.1 (38.8)	0.984 (0.007)	0.005 (0.020)	181 (758)	−270.6082
$\text{Cote d'Ivoire}_{1960–1993}$	186.1 (15.3)	0.918 (0.010)	0.366 (0.013)	−0.02 (0.19)	−294.5481
$\text{Cote d'Ivoire}_{1994–2004}$	226.9 (35.0)	0.965 (0.008)	0.438 (0.066)	0.42 (0.20)	−151.4810
$\text{Gabon}_{1960–1993}$	70.5 (7.1)	0.9845 (0.0091)	9.9e−14 (0.012)	9.3e+12 (1.2e+24)	−152.2235
$\text{Gabon}_{1994–2004}$	90.5 (25.8)	0.990 (0.009)	0.26 (0.32)	2.32 (4.00)	−51.4639
$\text{Guinea}_{1960–1993}$	109.7 (14.4)	0.923 (0.010)	0.510 (0.045)	0.39 (0.12)	−177.8969
$\text{Guinea}_{1994–2004}$	242.2 (41.4)	0.991 (0.003)	0.209 (0.036)	1.91 (0.55)	−114.6351
$\text{Togo}_{1960–1993}$	47.1 (4.4)	0.839 (0.018)	0.58 (0.07)	0.29 (0.21)	28.5583
$\text{Togo}_{1994–2004}$	177.4 (28.6)	0.970 (0.009)	0.18 (0.09)	3.63 (2.51)	−122.2017

[a] Asymptotic standard errors are given in parentheses. The $\log LL$ reported is specific to the contribution of each country. The insider constraint that a unilateral deviation of a coalition member is never violated is checked ex post in the last column. This is constraint (4) in the text. Regime parameters (α, ε) for each subperiod are estimated using all countries.

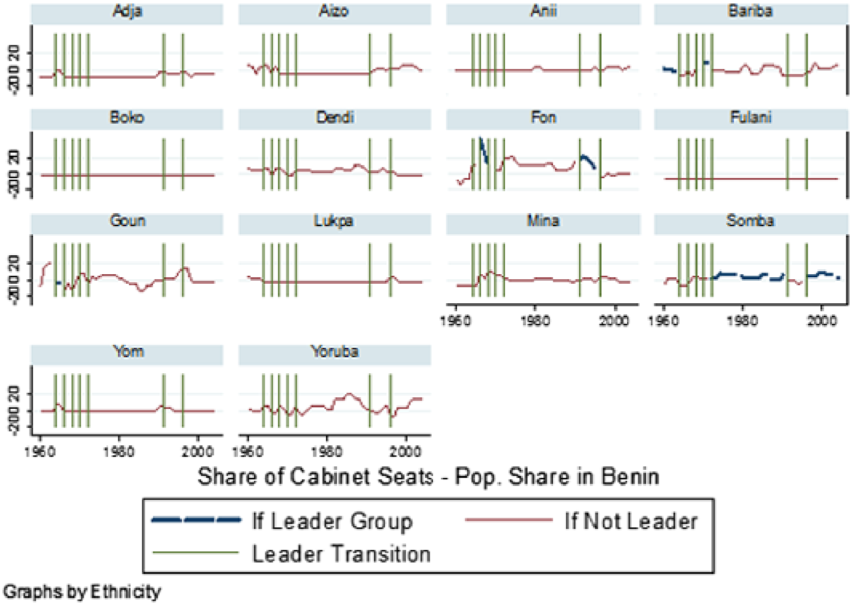
TABLE B.VI

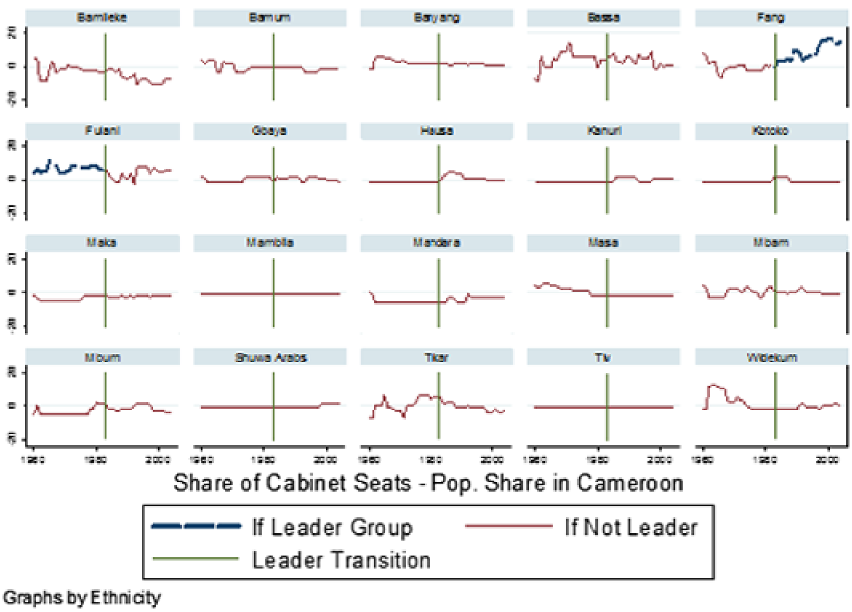
COUNTERFACTUAL REFERENDA[a]

1961 Referenda	Coalition Size (% Total Population)	Leadership Share (% Cabinet Posts)	Largest Group Share (% Cabinet Posts)
	Cameroon		
Data	0.940	0.225	0.231
Counterfactuals:			
Opposite	0.944	0.233	0.233
Both join NIG	0.935	0.255	0.273
Both join CAM	0.943	0.222	0.204
	Nigeria		
Data	0.908	0.161	0.181
Counterfactuals:			
Opposite	0.913	0.161	0.181
Both join NIG	0.918	0.157	0.176
Both join CAM	0.916	0.166	0.186
1956 Referenda	**Coalition Size (% Total Population)**	**Leadership Share (% Cabinet Posts)**	**Largest Group Share (% Cabinet Posts)**
	Ghana		
Data	0.640	0.168	0.226
Counterfactual:			
British Togo joins TOG	0.650	0.177	0.252
	Togo		
Data	0.595	0.285	0.235
Counterfactual:			
British Togo joins TOG	0.636	0.293	0.274

[a] These are counterfactual exercises had the referendum results been different, using the estimated parameters for the respective country obtained from the full sample period. Data for the 1961 referendum: Northern Cameroon opted for annexation to Nigeria and Southern Cameroons selected annexation to Cameroon. Data for the 1956 referendum: British Togo opted for annexation to Ghana.

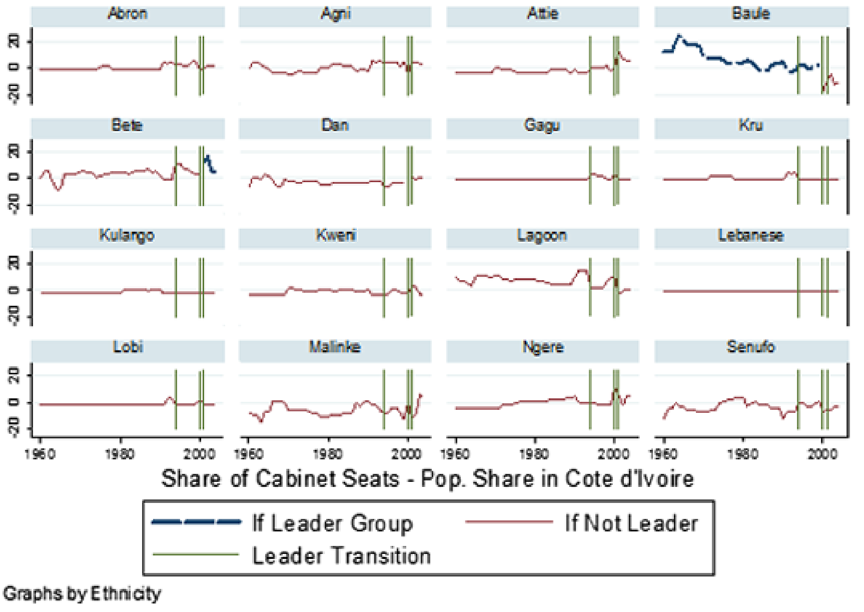
APPENDIX C: ADDITIONAL FIGURES

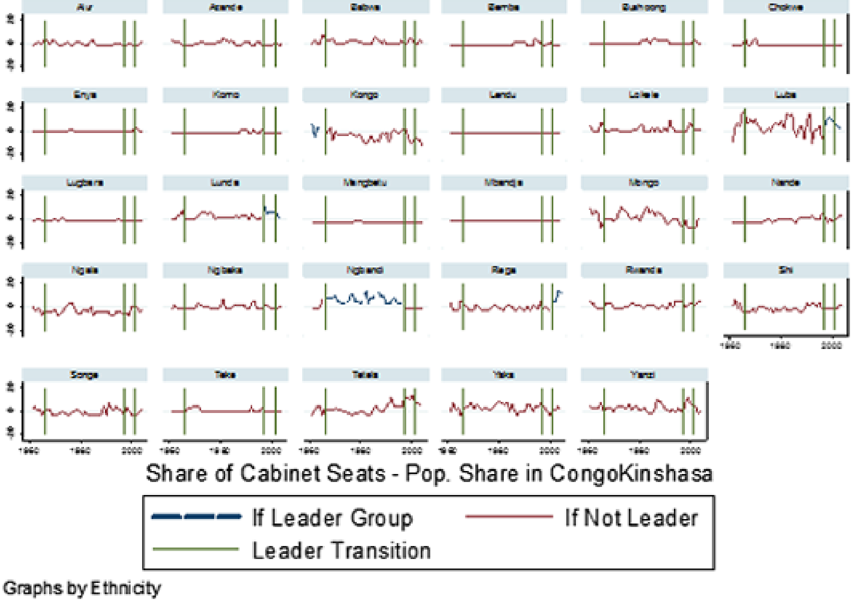




(Part i)

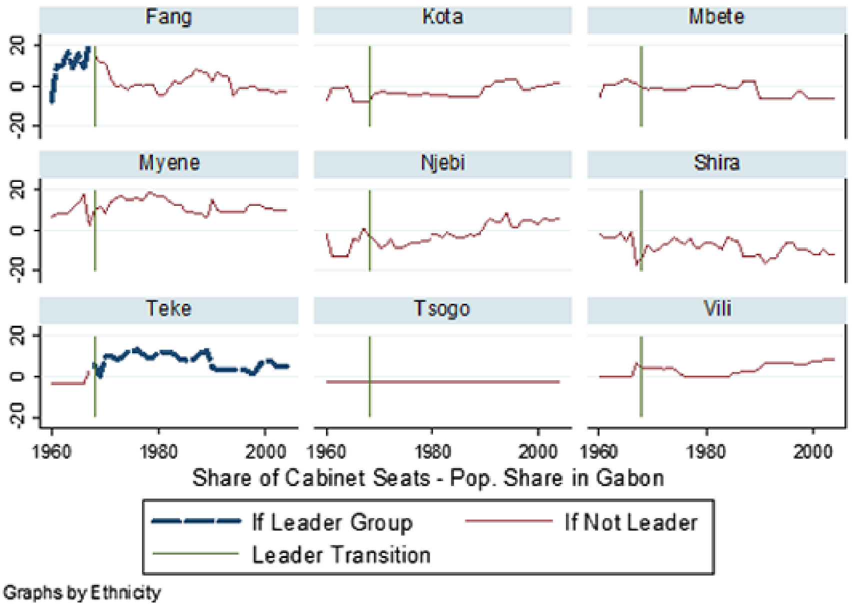
FIGURE C.1.—Cabinet shares and population shares. All countries, 1960–2004.

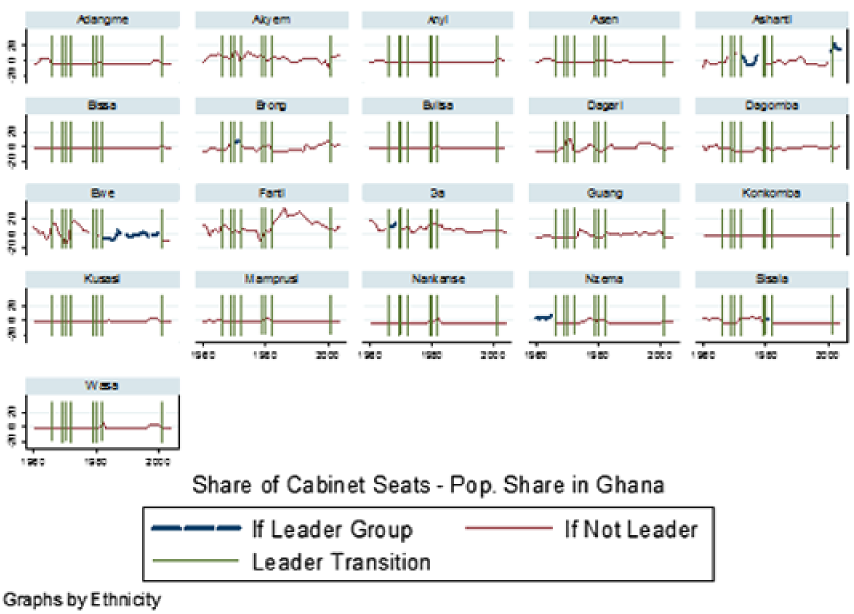




(Part ii)

FIGURE C.1.—*Continued.*





(Part iii)

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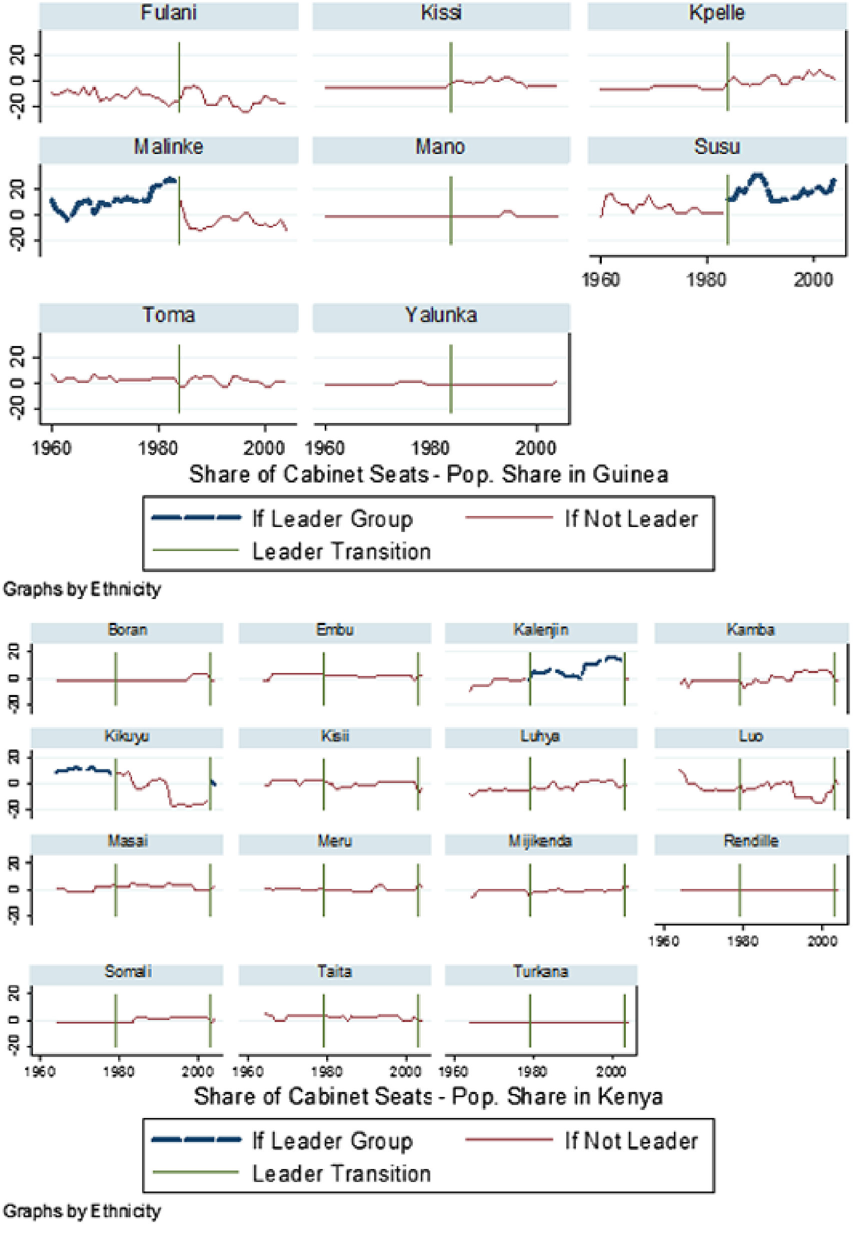
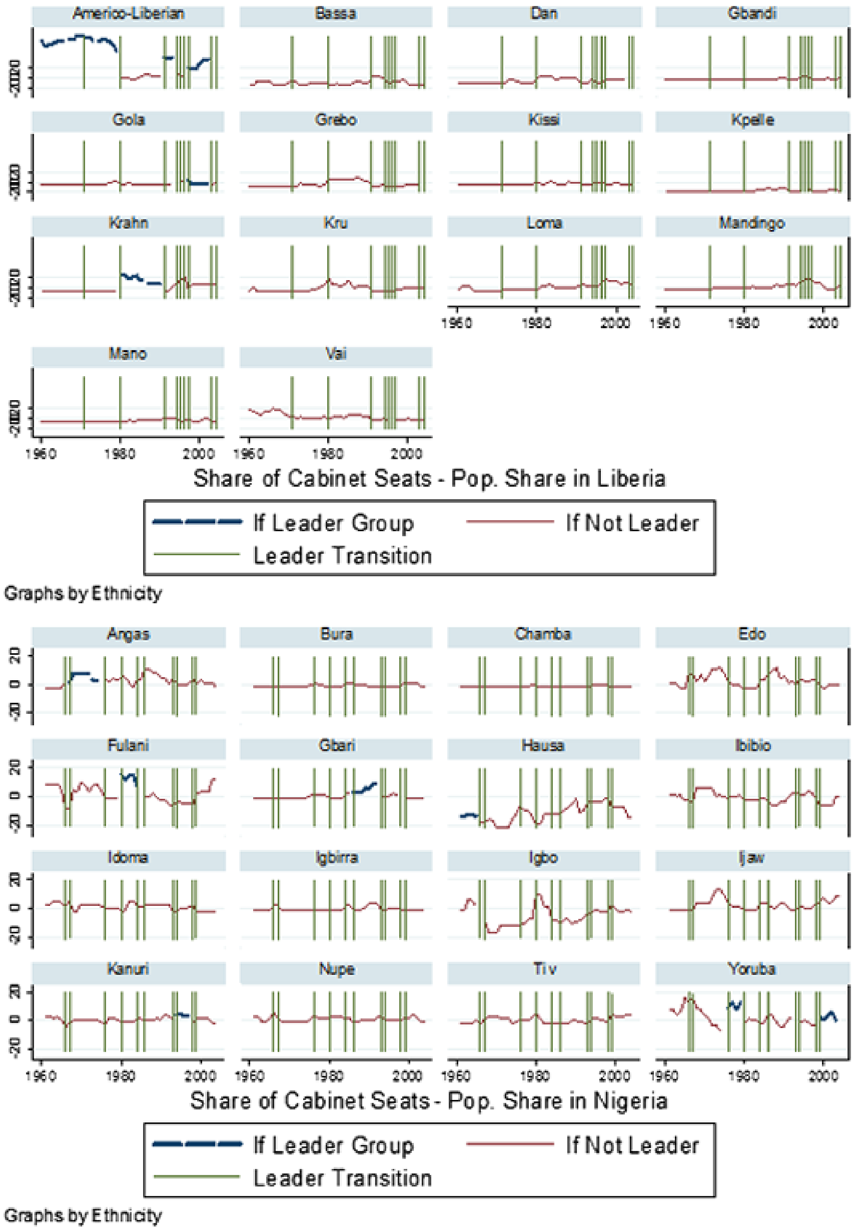


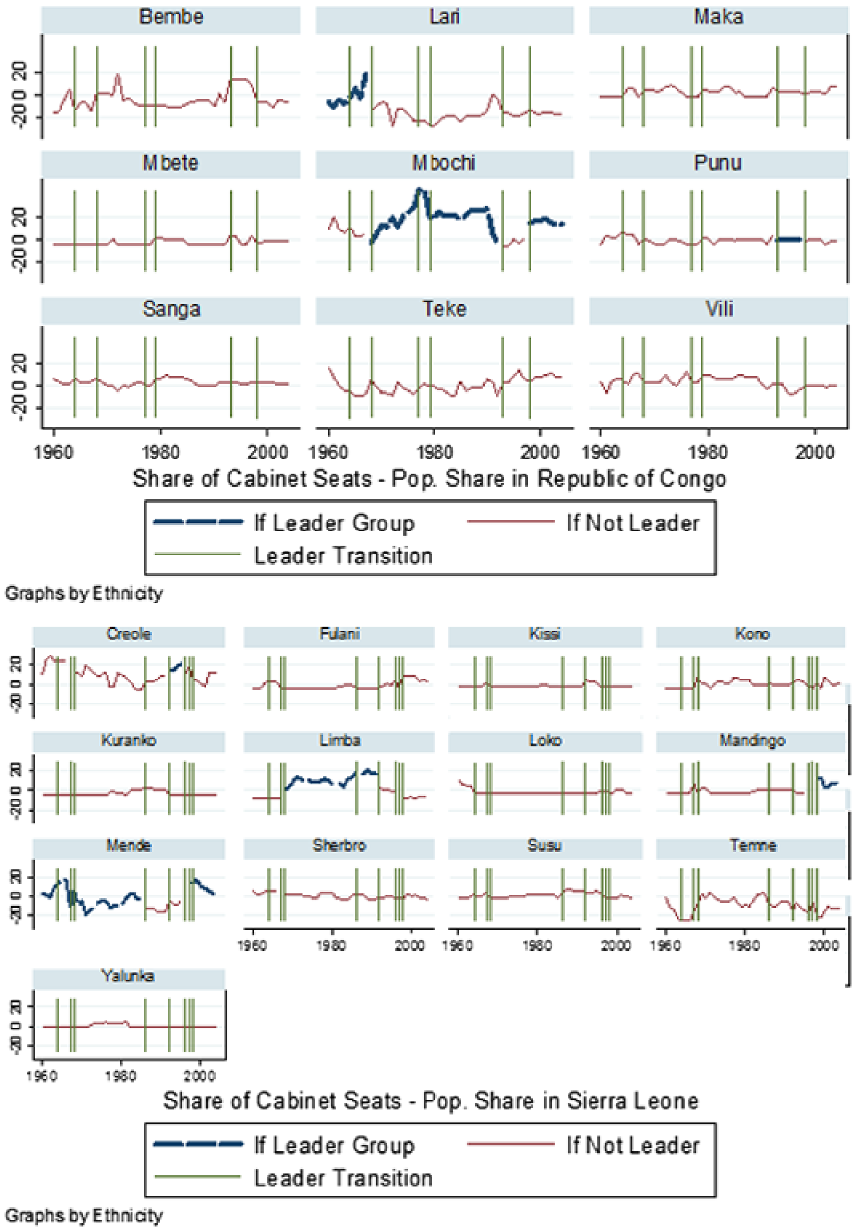
(Part iv)

FIGURE C.1.—*Continued.*



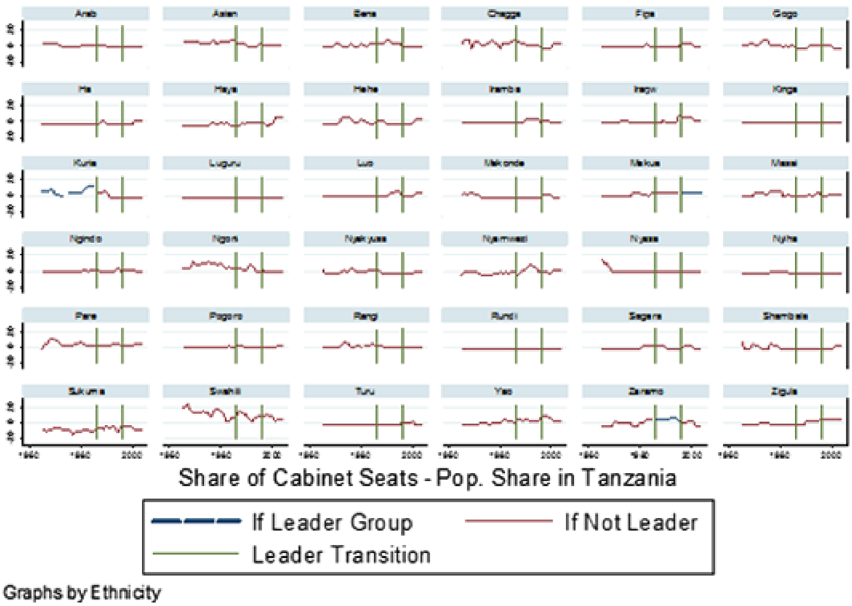
(Part v)

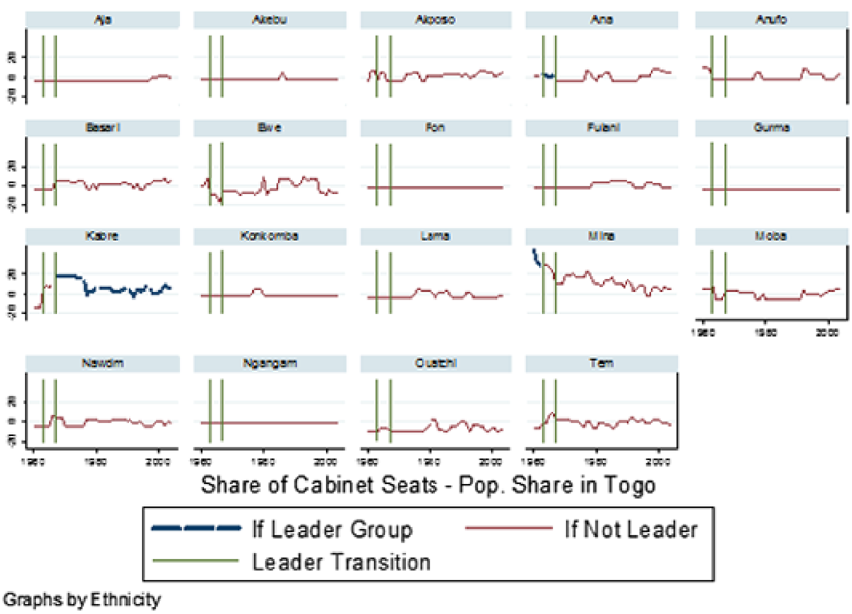
FIGURE C.1.—*Continued.*



(Part vi)

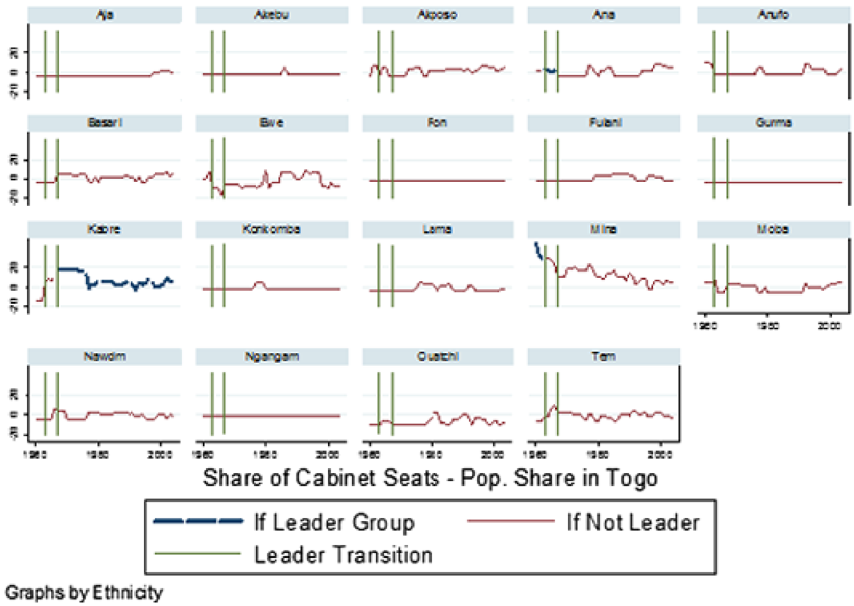
FIGURE C.1.—*Continued.*

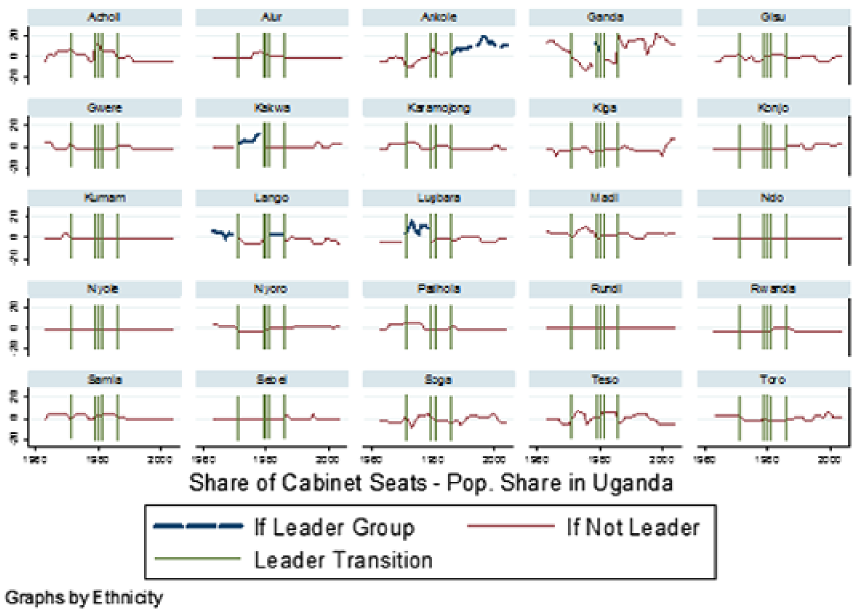




(Part vii)

FIGURE C.1.—*Continued.*





(Part viii)

FIGURE C.1.—*Continued.*

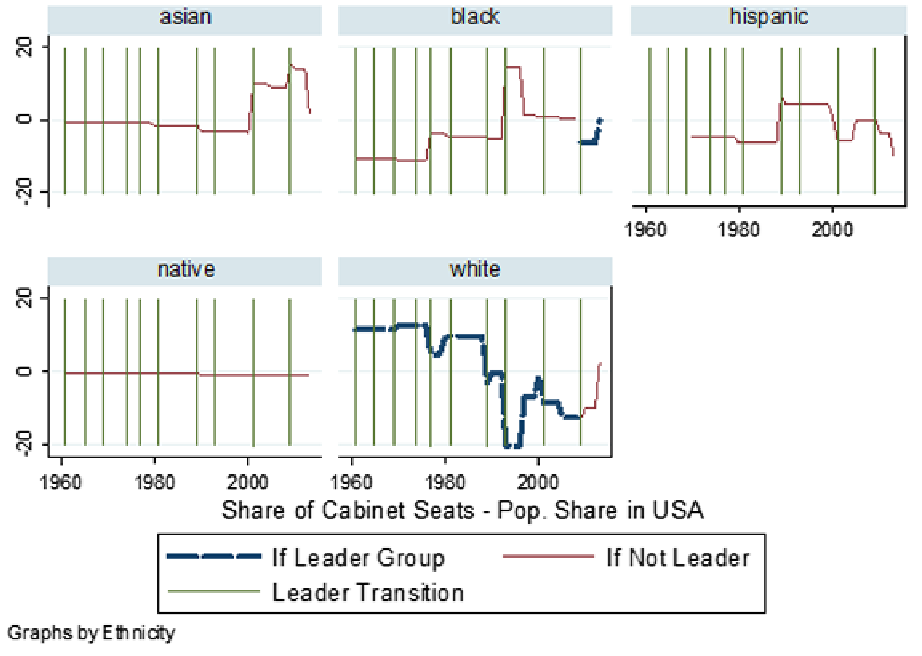


FIGURE C.2.—Difference between cabinet shares and population shares: United States, 1960–2008.

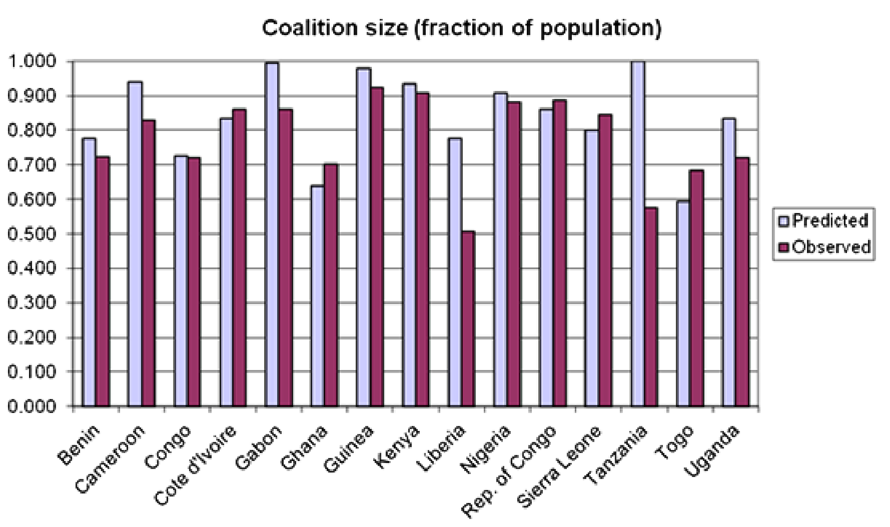


FIGURE C.3.—In-sample fit of coalition size.

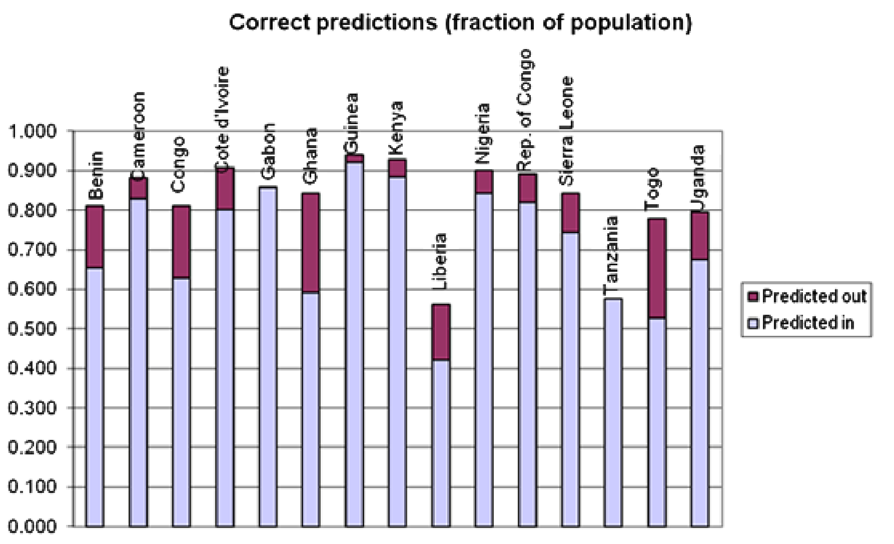


FIGURE C.4.—In-sample successfully predicted groups in percentage of population.

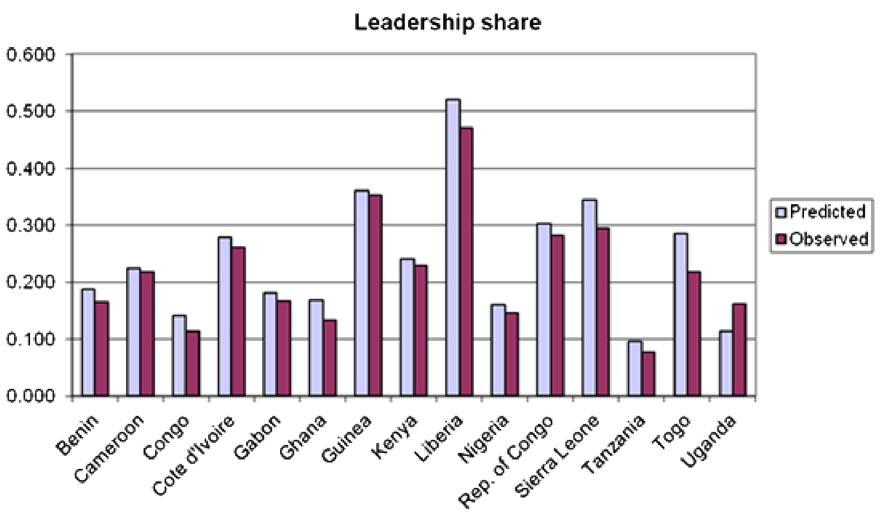


FIGURE C.5.—In-sample leadership shares.

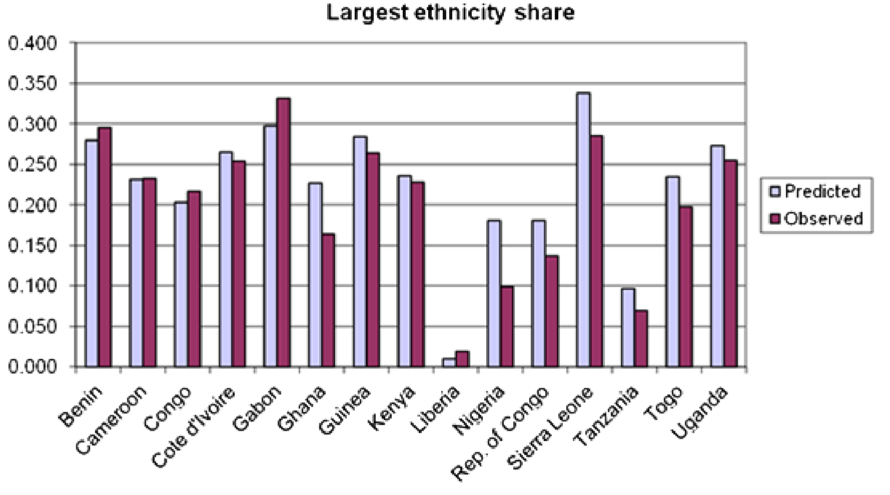


FIGURE C.6.—In-sample shares to largest group.

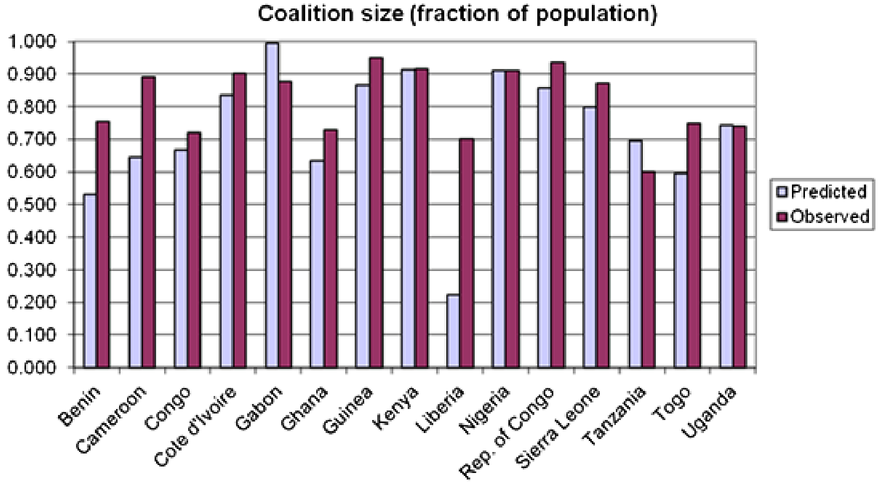


FIGURE C.7.—Out-of-sample fit of coalition size (1980–2004 predicted based on estimation of 1960–1980 sample).

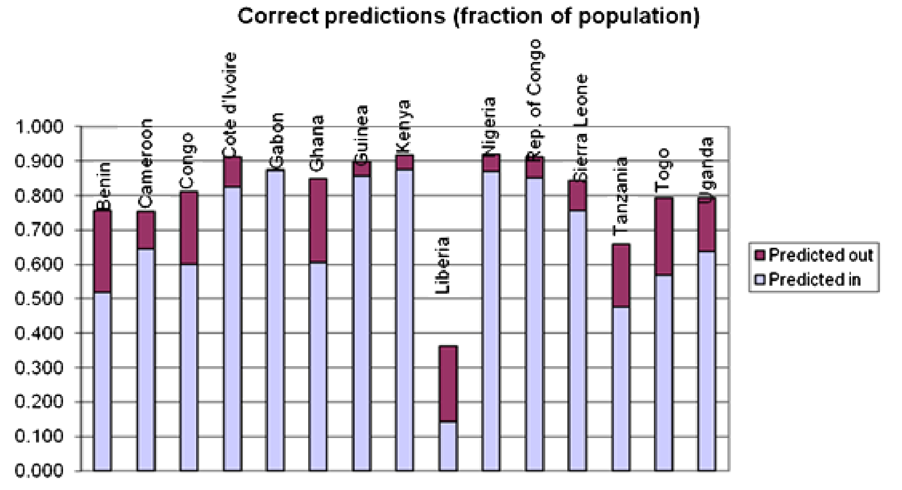


FIGURE C.8.—Out-of-sample fit of successfully predicted groups in percentage of population (1980–2004 predicted based on estimation of 1960–1980 sample).

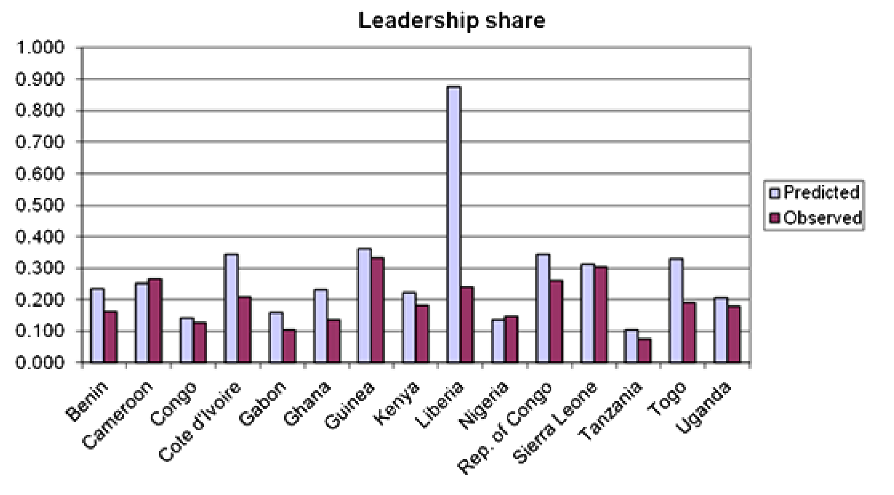


FIGURE C.9.—Out-of-sample fit of leadership shares (1980–2004 predicted based on estimation of 1960–1980 sample).

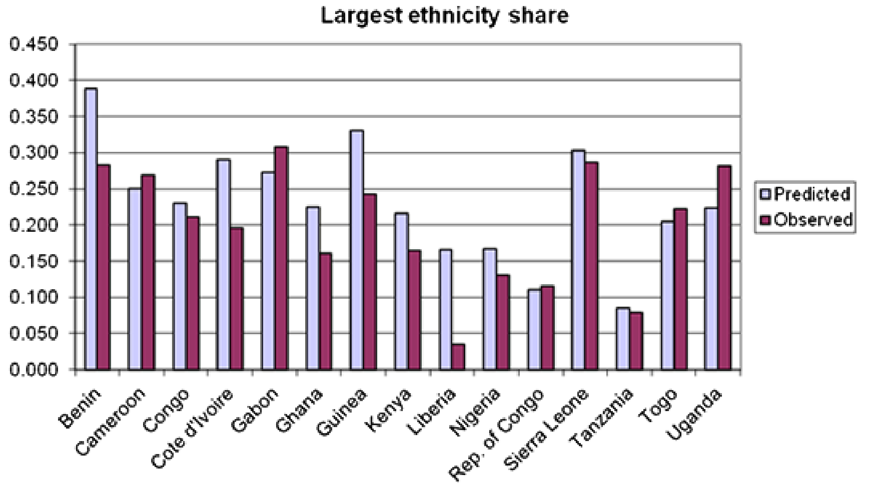


FIGURE C.10.—Out-of-sample fit of shares to largest group (1980–2004 predicted based on estimation of 1960–1980 sample).

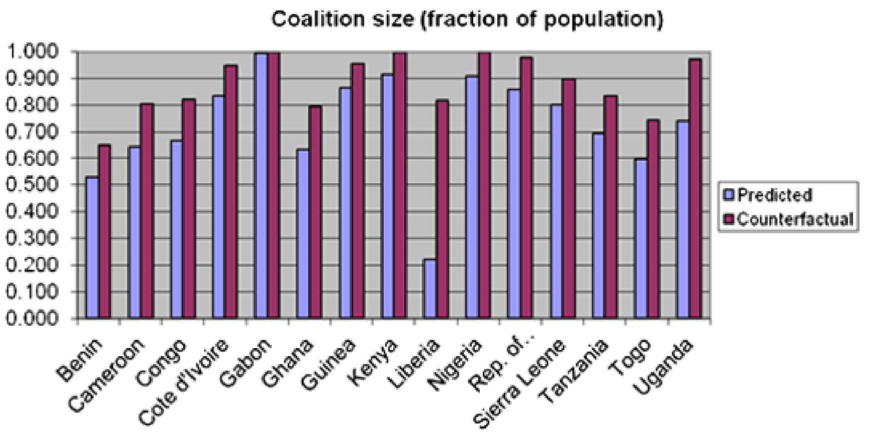


FIGURE C.11.—Counterfactual coalition size (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta r/r = +0.05$.

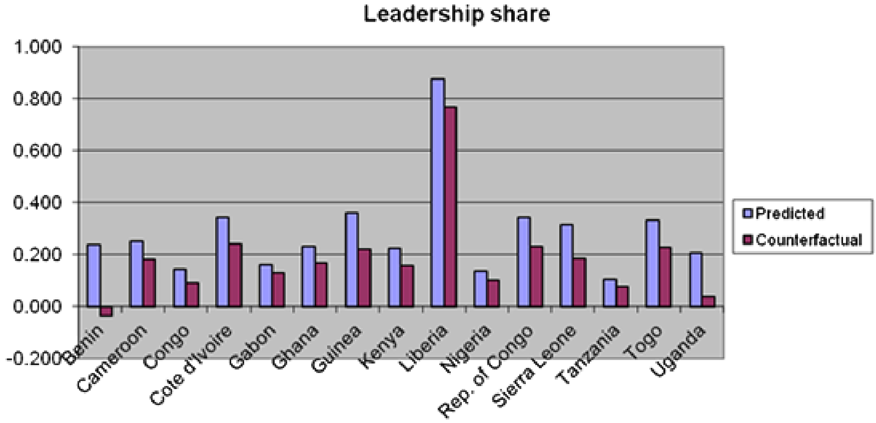


FIGURE C.12.—Counterfactual shares to leader's group (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta r/r = +0.05$.

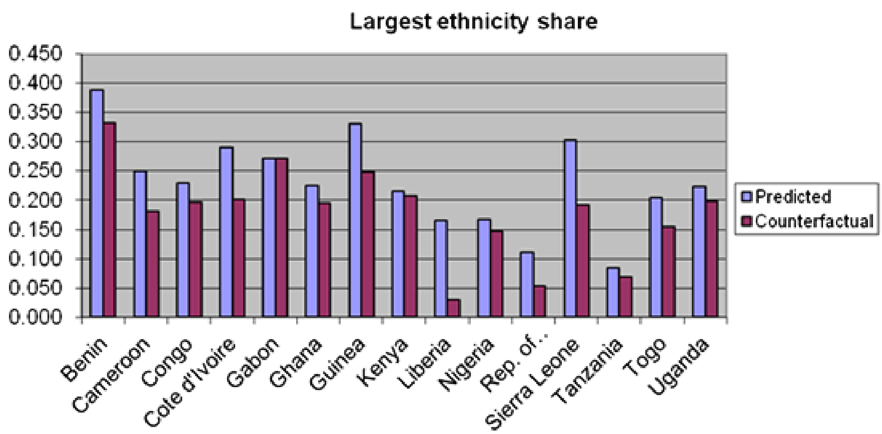


FIGURE C.13.—Counterfactual shares to largest group (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta r/r = +0.05$.

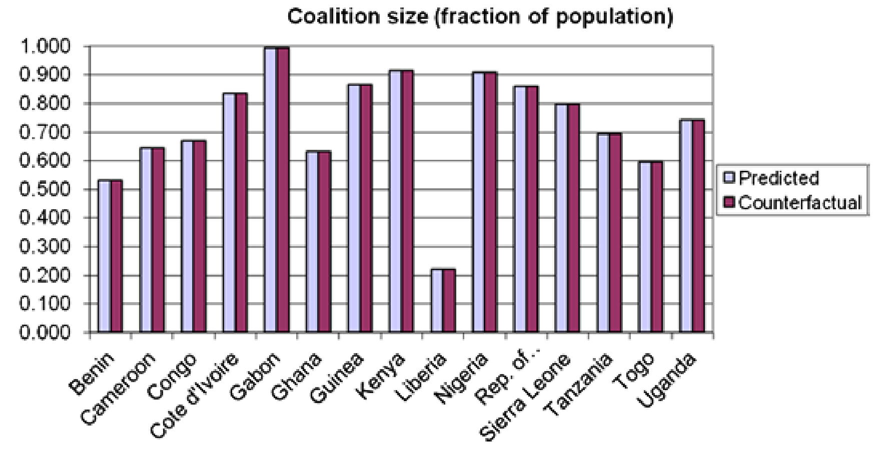


FIGURE C.14.—Counterfactual coalition size (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta\gamma/\gamma = -0.25$.

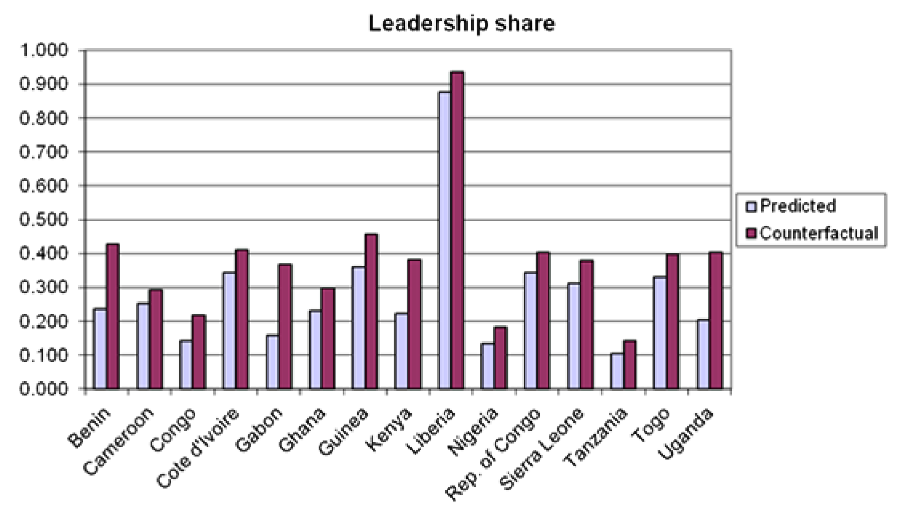


FIGURE C.15.—Counterfactual shares to leader's group (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta\gamma/\gamma = -0.25$.

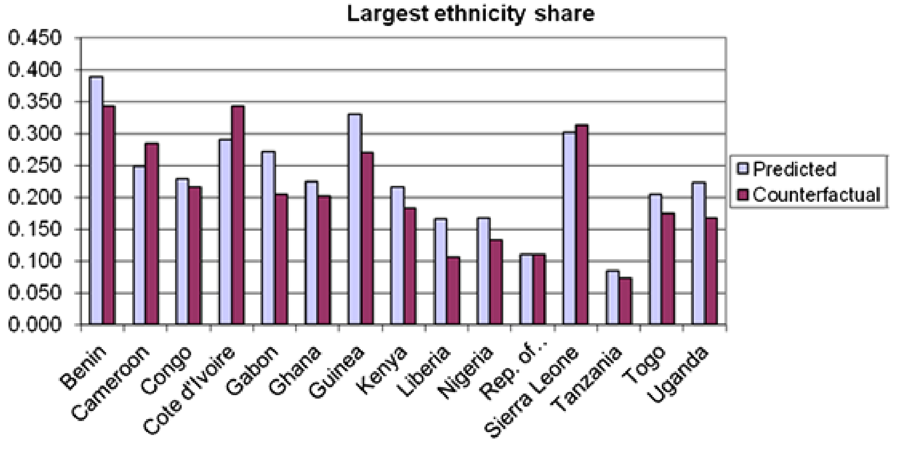


FIGURE C.16.—Counterfactual shares to largest group (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta\gamma/\gamma = -0.25$.

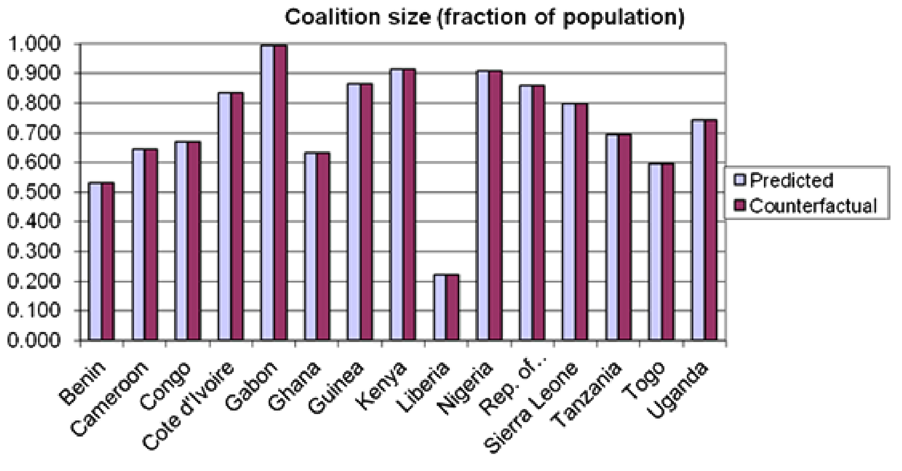


FIGURE C.17.—Counterfactual coalition size (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta F/F = -0.25$.

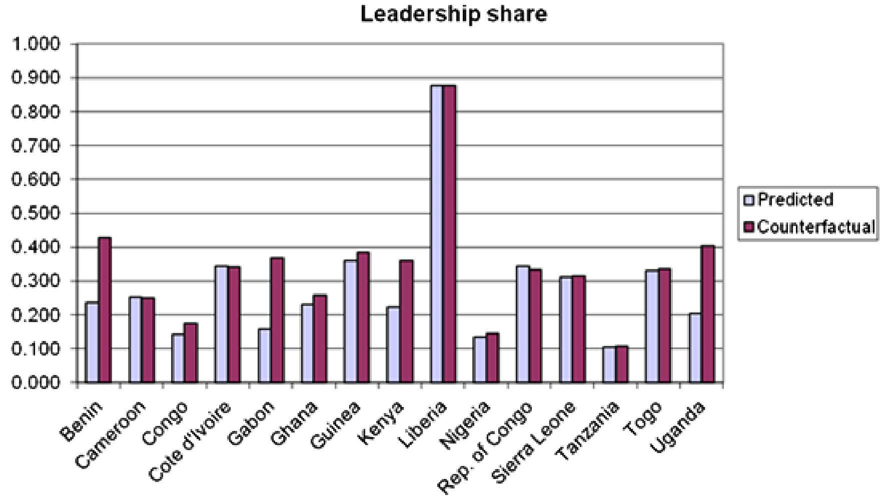


FIGURE C.18.—Counterfactual shares to leader's group (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta F/F = -0.25$.

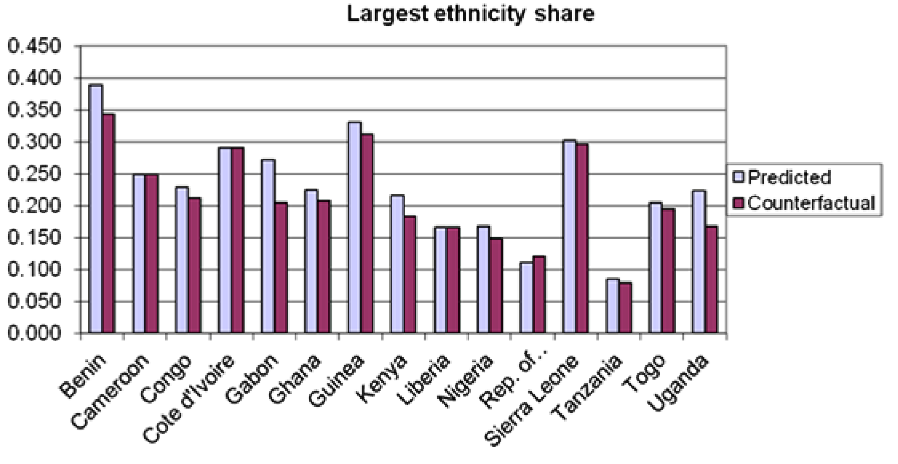


FIGURE C.19.—Counterfactual shares to largest group (1980–2004 predicted based on estimation of 1960–1980 sample); $\Delta F/F = -0.25$.

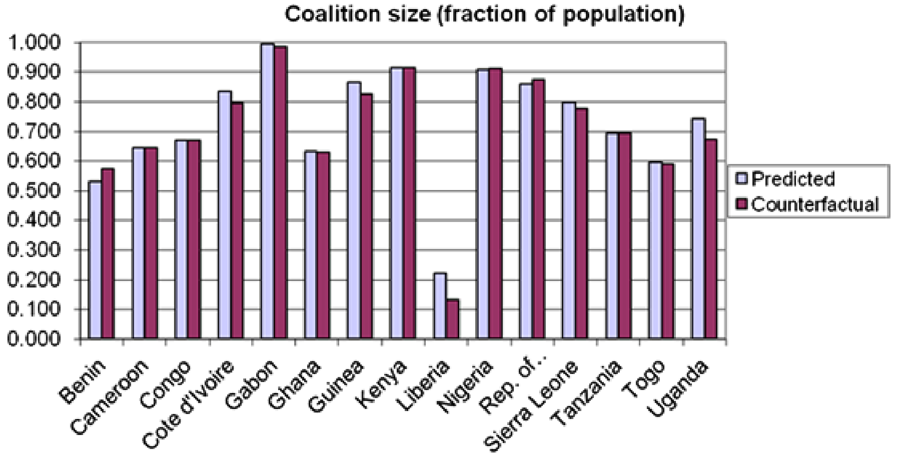


FIGURE C.20.—Counterfactual coalition size (1980–2004 predicted based on estimation of 1960–1980 sample). Counterfactual distribution $n_i = n_i - 1\%$ for $i = 1, \dots, \frac{N}{2} - 1$; $n_i = n_i + 1\%$ for $i = \frac{N}{2} + 1, \dots, N$.

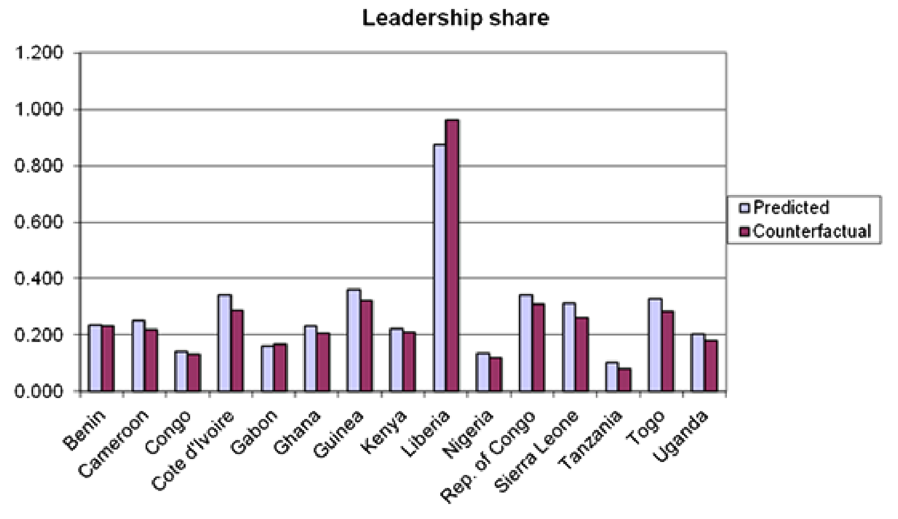


FIGURE C.21.—Counterfactual shares to leader's group (1980–2004 predicted based on estimation of 1960–1980 sample). Counterfactual distribution $n_i = n_i - 1\%$ for $i = 1, \dots, \frac{N}{2} - 1$; $n_i = n_i + 1\%$ for $i = \frac{N}{2} + 1, \dots, N$.

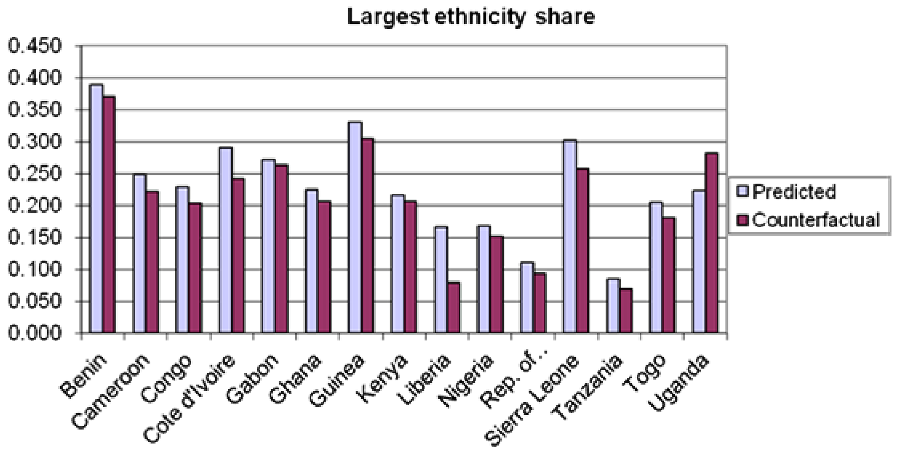


FIGURE C.22.—Counterfactual shares to largest group (1980–2004 predicted based on estimation of 1960–1980 sample). Counterfactual distribution $n_i = n_i - 1\%$ for $i = 1, \dots, \frac{N}{2} - 1$; $n_i = n_i + 1\%$ for $i = \frac{N}{2} + 1, \dots, N$.

REFERENCES

ALESINA, A., A. DEVLEESHAUWER, W. EASTERLY, S. KURLAT, AND R. WACZIARG (2003): "Fractionalization," *Journal of Economic Growth*, 8 (2), 155–194. [15]

BURGESS, R., R. JEDWABY, E. MIGUEL, A. MORJARIA, AND G. PADRO I MIQUEL (2011): "Ethnic Favoritism," Report, LSE. [14]

FEARON, J. D. (2003): "Ethnic and Cultural Diversity by Country," *Journal of Economic Growth*, 8 (2), 195–222. [15]

GALLAGHER, M. (1991): "Proportionality, Disproportionality and Electoral Systems," *Electoral Studies*, 10, 33–51. [16]

JACKSON, R., AND C. ROSBERG (1982): *Personal Rule in Black Africa: Prince, Autocrat, Prophet, Tyrant*. Berkeley: University of California Press. [13]

PADRO I MIQUEL, G. (2007): "The Control of Politicians in Divided Societies: The Politics of Fear," *Review of Economic Studies*, 74 (4), 1259–1274. [14]

Vancouver School of Economics, University of British Columbia, 1873 East Mall, Vancouver, BC V6T1Z1, Canada and CIFAR; patrick.francois@ubc.ca,

Dept. of Economics, George Mason University, 4400 University Drive, MS 1D3, Fairfax, VA 22030, U.S.A.; irainer@gmu.edu,

and

Vancouver School of Economics, University of British Columbia, 1873 East Mall, Vancouver, BC V6T1Z1, Canada, NBER, and CIFAR; francesco.trebbi@ubc.ca.

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