# Cold War Alliances in Africa and Modes of Economic Development

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# Motivation

- In Africa, decolonization/independence coincided with Cold War.
  - Superpowers' competition for Africa. (Latham 2010)
  - Institution building and political change.
- Cold War blocs represented different (incompatible) modes of economic organization. (Gould-Davies 2003; Engerman 2010)
  - Fixed costs of alignment and irreversible economic investments.
  - Path dependence.

$\rightarrow$ Potential for long-run effects on development.

# Cold War in Africa: A Game of Social Interactions

1. Cold War in Africa as a problem of alignment: Eastern or Western bloc?
   - Country histories→arbitrary/fuzzy classification.
2. Game-theoretic approach: Alignment choice depends on bilateral ties b/w African countries.
   - Bilateral links relatively straightforward to evaluate.
   - Colonial legacy left many leaders wary of alliances with the superpowers.
   - Historical, religious, linguistic, geographical ties b/w countries determine pairwise propensity to cooperate.

Flag of Angola

# Research Question

- Does the predicted pattern of alignment correlate with long-run development outcomes in Africa?
  - Validate the predicted alignment using UN voting patterns.

  Preview of results:
  1. The partition splits the continent roughly in half, North and South.
  2. The partition predicts alignment in UN roll call voting.
  3. The partition correlates with modes of economic development but not levels.

# Contribution to the Literature

1. Economics literature on history matters (Nunn 2009)
   - Effect of political alliances (Gökmen 2017, 2018)
   - Impact of Cold War (Berger et al. 2013)
2. Political science literature on international alliances (Altfeld and Bueno de Mesquita 1979, many others)
   - Cold War context provides "exogenous" number of groups (Florian and Galam 2000)
   - Game-theoretic reformulation of landscape theory (Axelrod and Bennett 1993)

# The Model

- Players: N countries
- Strategies: Each country chooses an alignment with one of two blocs.
- Payoffs: Utility is given by the value of the pairwise relationships among those in the chosen bloc. The parameters:
  - N-dimensional vector s with i-th coordinate, $s_i$, representing the size or importance of country i to others.
  - $N \times N$ matrix P with each entry $p_{ij}$ representing the propensity of two countries, i and j, to cooperate.
  - Propensities are symmetric.

# Two approaches to solution

1. Cooperative approach yields efficiency.
   - Efficiency: maximize social welfare.
   - Social planner sorts like with like.
2. Non-cooperative approach yields stability.
   - A stable configuration is when no group of countries (of any size) wants to switch blocks.
   - In the Cold War environment, Nash equilibria (stable to a single country deviation) likely unstable.
   - In our game, there exists a Strong Nash ensuring stability.

In our setting, Strong Nash Eqlb. solution merges efficiency & stability.

# Max Cut

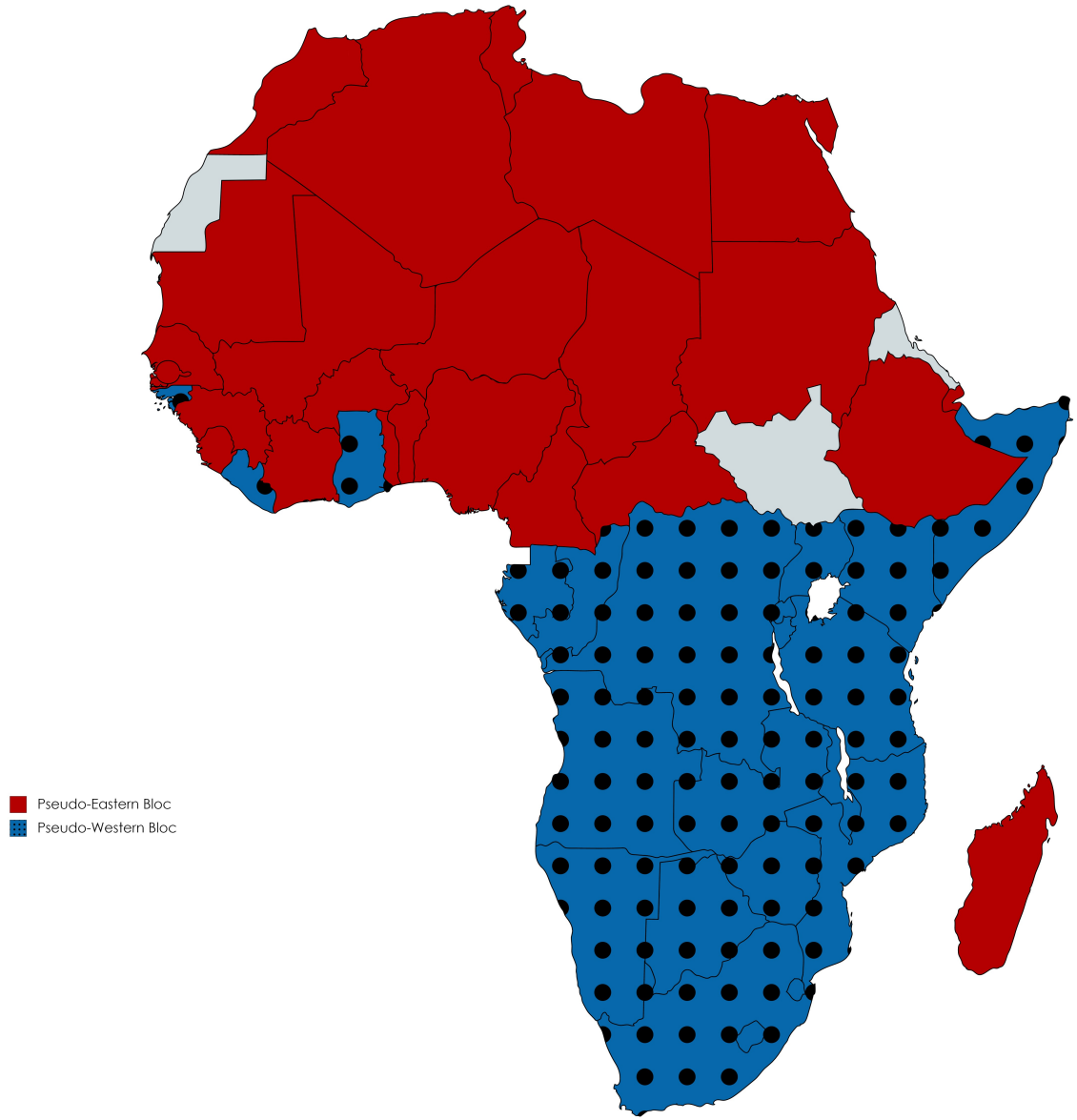
- Brute force for African countries computationally problematic ($2^{54}/2$).
- Recast the problem as Max Cut
  - Exact solution using branch and bound algorithm (Rodrigues de Sousa 2018).
  - Employ Goemans and Williamson (1994) approximation algorithm.
  - Follow the gradient until obtain an equilibrium.

# Pairwise matrix of bilateral distances

- Propensity matrix:
  - Pairwise distances weighted sum across six dimensions:
    - ★ Genetic, Linguistic, and Religious distances (Spolaore and Wacziarg, 2015)
    - ★ Geodesic Distance (CEPII), Contiguity (COW), Common Colonizer (CEPII)
  - Sizes of countries as weights:
    - ★ National Material Capabilities (COW)
  - We follow Axelrod and Bennet (1993).
- Complete pairwise data for 47 African countries.

# Map of Equilibrium Configuration

Figure: Pseudo-Western and Pseudo-Eastern Partition



# Examining alignment during the Cold War

- UN General Assembly voting alignment. (Gareau 1971)
  - No general history of the Cold War in Africa means imperfect verification of predictions.
  - Actual alliances were fluid.
  - Leader preferences may differ from population preferences.
- Other possibilities:
  - Official alliances
  - Expert analysis of case studies.

# UN Voting and Alignment

- Roll call votes:
  - Voting similarity reveals compatible preferences or views (Gartzke and Gleditsch 2006)
  - Votes aggregate diverse interests across varied themes.
  - Votes between 1960-1991 ($\sim$ 2500 votes)
- Each vote is a realized partition.
  - Votes occur at fixed points in time.
  - Little to no commitment to realized alignment.
  - Roughly 11% voted with the US.

# Econometric Specification I

We estimate the following specification:

$$\text{vote}_{\text{it}}^{\text{USA}} = \alpha + \gamma_{\text{P}} * \text{PseudoWestern}_{\text{i}} + \eta_{\text{t}} + \epsilon_{\text{it}} \tag{1}$$

- i indexes countries and t indexes votes.
- Control for vote fixed effects.
- Control for Cold War interventions.
  - Collected from various sources
  - Eight possible intervention types: East/West; Economic/Military; Hostile/Non-hostile.

# Results of Validation Exercise I

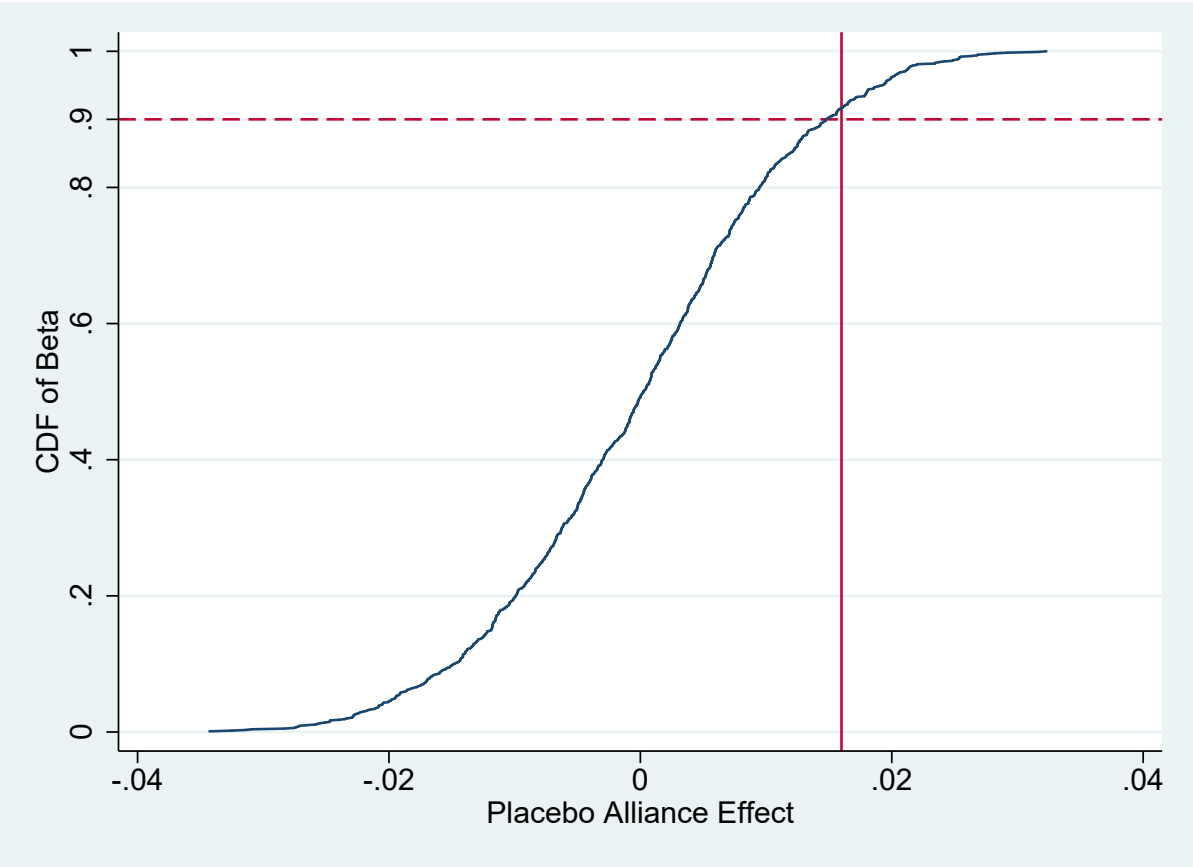
Table: Cold War Alliances and UN Voting Patterns

| Dep. Var. = | Vote with the US | |
|---|---|---|
| | (1) | (2) |
| Pseudo-Western Bloc | 0.015*** | 0.016*** |
| | [0.001] | [0.001] |
| Cold War Interventions | NO | YES |
| Vote FE | YES | YES |
| Country FE | NO | NO |
| Sample | Roll call votes betw 1960-1991 | |
| Observations | 99944 | 99944 |

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

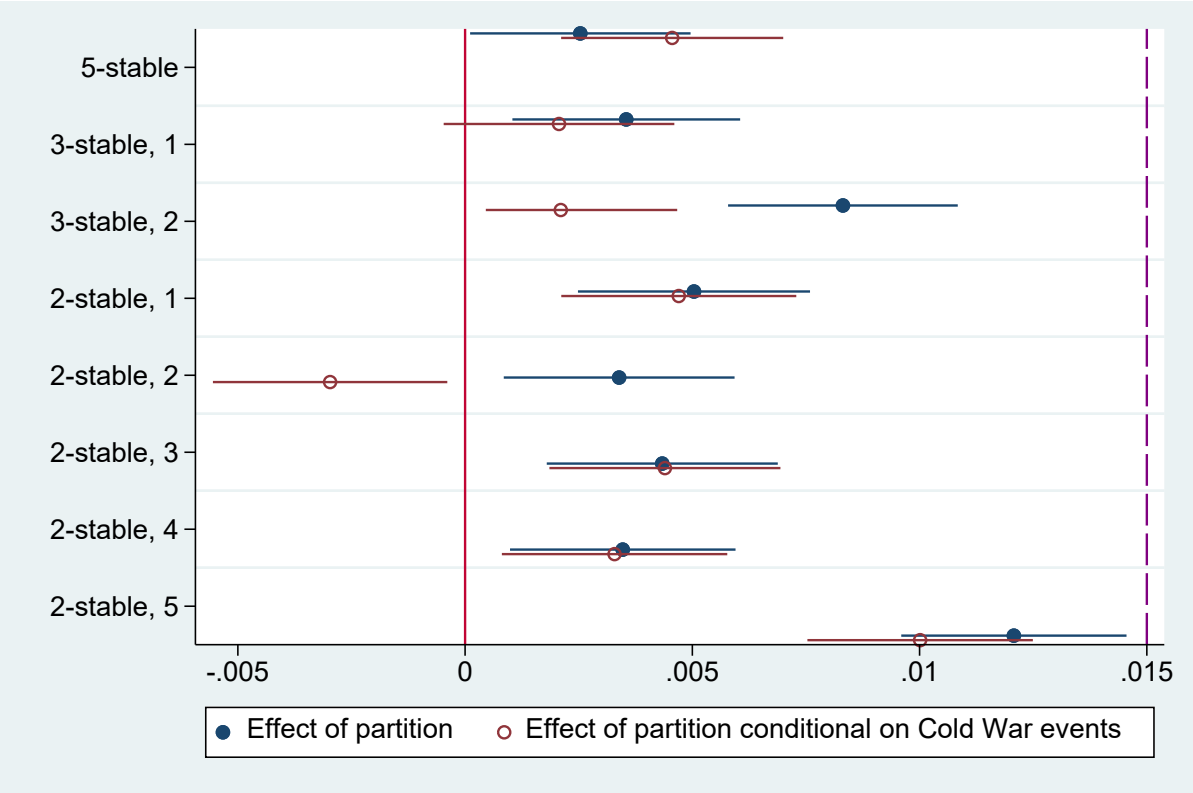
# Randomized Inference: Partition

Figure: Distribution of Placebo Alliance Effects



# Robustness Checks: Stability

Figure: Effects of other Nash Equilibria



# Additional Robustness Checks

- Alternative estimation:
  - Results hold when specifically accounting for serial correlation or arbitrary within-country correlation.
- Alternative matrix that accounts for pre-colonial institutions:
  - Quantitatively similar results.
- Alternative start and end points:
  - Adding 1950s strengthens the results; little change if move end point earlier to 1989 or 1985
- By decade:
  - Results hold for each decade up to the 90s, but then start to break down post-Cold War.
- By cold war topic
  - Results stable to restricting attention to "relevant" votes.
  - Results hold for both African-specific (colonialism) and generic themes (nuclear weapons)

# Two modes of development

- Western mode
  - Capitalism relies on the market economy to allocate resources.
  - Capitalism requires basic freedoms to support decentralized decision-making.
  - Capitalism leads to sustained economic growth, socialism will be a failure.
- Eastern mode
  - Perfection of man.
  - Lenin: Коммунизм = Советскя Власть + Электрификаця ("Communism is Soviet power plus electrification of the whole country!")
  - Catch-up and surpass.

# Results

Table: Cold War Alliances and Long-run Development Outcomes, Main

| Dep. Var. = | Panel A: GDP per capita (1950) (1) | Life Exp. At Birth (1965) (2) | GDP per capita (Avg. 1990-2016) (3) | Life Exp. At birth (Avg. 1990-2016) (4) | Poverty Head Count Ratio (Avg. 1990-2016) (5) | Urban share of Population (Avg. 1990-2016) (6) |
|---|---|---|---|---|---|---|
| Pseudo-Western Bloc | 183.77 | 1.91 | -381.95 | -4.88** | 6.88 | -7.29* |
| (Strong Nash) | [144.005] | [1.414] | [1,404.311] | [1.880] | [6.322] | [4.313] |
| GDP per capita, 1950 | | 0.01*** | 4.47*** | 0.01*** | -0.03*** | 0.02*** |
| (Maddison) | | [0.002] | [0.863] | [0.002] | [0.005] | [0.004] |
| Observations | 45 | 45 | 44 | 45 | 41 | 45 |
| R-squared | 0.037 | 0.387 | 0.186 | 0.318 | 0.331 | 0.250 |

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

# Results

Table: Cold War Alliances and Long-run Development Outcomes, Intermediary

| | Panel B: | | | | | | |
|---|---|---|---|---|---|---|---|
| Dep. Var. = | Income Inequality (Avg. 1990-2016) | Access to Electricity (Avg. 1990-2016) | Polity 2 Index (Avg. 1990-2016) | Adult Literacy Rate (Avg. 1990-2016) | Educ. Exp. % Govt. Exp. (Avg. 1990-2016) | Gender Parity Index (Educ.) (Avg. 1990-2016) | Financial Account Holders (Avg. 1990-2016) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Pseudo-Western Bloc | 5.37** | -14.12* | 2.30* | 19.90*** | 1.92* | 0.09** | 9.90** |
| (Strong Nash) | [2.022] | [7.642] | [1.262] | [4.491] | [0.985] | [0.042] | [3.965] |
| GDP per capita, 1950 | -0.00 | 0.04*** | 0.00 | 0.01*** | 0.00 | 0.00** | 0.02*** |
| (Maddison) | [0.003] | [0.006] | [0.002] | [0.003] | [0.001] | [0.000] | [0.005] |
| Observations | 41 | 45 | 45 | 44 | 43 | 44 | 41 |
| R-squared | 0.143 | 0.337 | 0.127 | 0.440 | 0.096 | 0.208 | 0.498 |

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

# Recap: Long-run development outcomes

- Pseudo-Western Alliance did not lead to greater income per capita.
- If anything, Pseudo-Western alliance→worse development
  - Lower Life expectancy
  - Lower Urbanization
  - Greater Inequality
  - Lower infrastructure proxied by electrification
- Important intermediary outcomes for long-run growth however favor Western-allied:
  - Higher democracy
  - Greater human capital: literacy rate, gender parity
  - More financial penetration

# Concluding remarks: History matters but how?

- We uncover a correlation between a predetermined 'tacit alignment' and modes of development in Africa.
  - Cold War influence offers an explanation for the correlation.
  - 'Tacit alignment' predicts UN voting patterns.
- Political alignments in Africa during the Cold War were fluid and dynamic and difficult to observe/verify.
  - Difficult to characterize as a "treatment".
- Yet, stable structure of endogenous alignment given by theory yields a "treatment."
  - Represents an alternative approach to incorporating history when history is messy.

# Results of Validation Exercise II

Table: Cold War Alliances and UN Voting Patterns

| Dep. Var. = | Vote with the US | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Pseudo-Western Payoff (SN) | -0.075*** | -0.074*** | | |
| | [0.0035] | [0.0036] | | |
| Pseudo-Eastern Payoff (SN) | 0.026*** | 0.025*** | | |
| | [0.0013] | [0.0013] | | |
| Pseudo-Western Payoff (Unrestricted) | | | -0.001 | -0.006 |
| | | | [0.005] | [0.005] |
| Pseudo-Eastern Payoff (Unrestricted) | | | 0.034*** | 0.029*** |
| | | | [0.004] | [0.004] |
| $\beta^{W} + \beta^{E} = 0$: $\chi^2(1)$ | 3.27* | 3.32* | 0.75 | 0.48 |
| SN = Unrestricted: $\chi^2(1)$ | | | 3.87** | 3.68* |
| Cold War Interventions | NO | YES | NO | YES |
| Vote FE | YES | YES | YES | YES |
| Country FE | YES | YES | YES | YES |

# Randomized Inference: Difference in Payoffs

Figure: Distribution of Placebo Alliance Effects