Ways to Use Forecasts of Violence

- Point predictions built from theory
- Evaluate policy relevance of theory
Three Kinds of Forecasts

- Game Theoretic
- Time Series
- Structural

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Blending Time-Series and Structural Approaches

- Structure, behavior, and country intercepts

**Figure 1.** Separation plots for CRISP Model Prediction of UCDP Data

- In-Sample: January 2001–December 2010
- Out-of-Sample: January 2011–December 2011
Building Policy Relevant Structural Models

- Muchlinski et. al. (2016) on annual civil war onset 1945-2000
- Coefficients vs. random forests for rare events

Figure 1: Separation plots for all classifiers.
Policy Relevant Structural Forecasts

- Muchlinski et. al. (2016)
- Random forest solves rare events problem

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Identifying Policy Relevance of Theory

- Over-fitting & excessive complexity
- Over generalization of models
- Substantive significance
- Unrealistic marginal effects
Identifying Excessive Complexity

- deMarchi et. al. (2004) MID onset 1945-1989
- Simple logit vs. complex neural network
  - What about a random forest?
Over Generalization of Effects

- Forecasting models trained on 1945-1992 vs. 1914-1945
- AUC 0.87 vs. 0.74
Unrealistic Extrapolation of Effects: Democracy and Terrorism


• Baseline model out of sample AUC = 0.89
Democracy, Wealth & Terrorism

- Gelpi and Avdan (2015)
- With democracy AUC = 0.89, without = 0.886

Figure 2. Estimated areas under the ROC curve for models deleting democracy and wealth.
Forecasting Integrates Theory and Policy

- Structural models make relevant predictions
- Forecasting disciplines policy relevance of theory
- Limitation: causal impact
- Complement with causal inference designs
References


