Engaging Experts

Dealing with Divergent Elicited Priors in Political Science

Sarah B. Bouchat

University of Wisconsin–Madison

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Introduction & Research Question

Question

How can an elicited priors approach be better integrated into social scientific research to contribute and evaluate information in statistical analyses?

Elicited priors utilize substantive knowledge of experts, through interviews or published research, to improve the accuracy of posterior estimates in Bayesian analysis.

Motivation

- Many authoritarian and developing countries are "low-information environments"
  - Data are missing not-at-random or intentionally obscured
  - Impacts strategic behavior and the analysis of political outcomes and objectives
- Literature currently addresses methodological and substantive concerns separately
  - Evaluations of direct censorship (e.g., King, Pan, and Roberts 2013)
  - Information and credible sources through networks (Acemoglu et al. 2011)

Example Empirical Application

Question

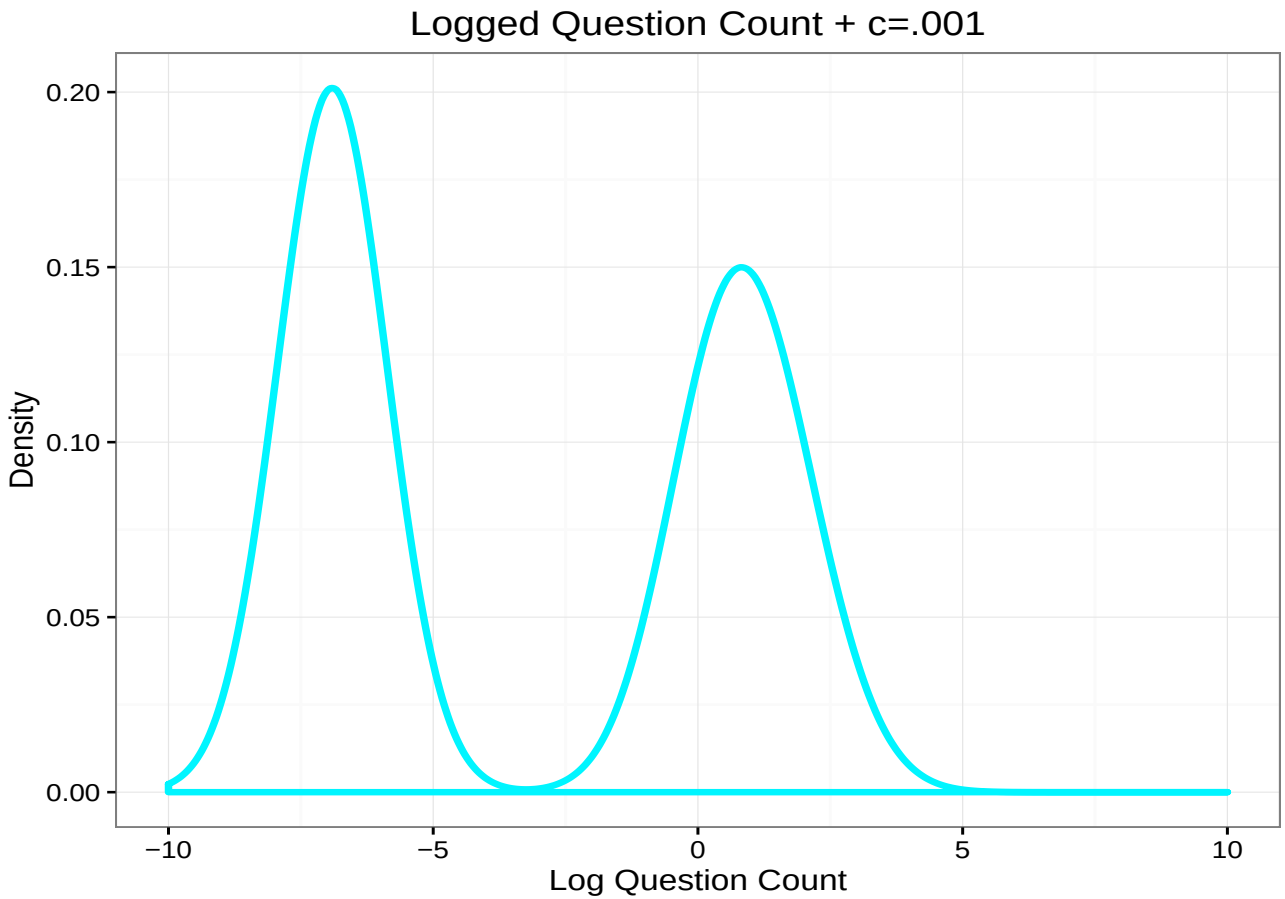
What motivates participation in authoritarian legislatures?

If authoritarians create legislatures to solve information or commitment problems, what explains variation in legislators' use of the forum?

- Balance of career objectives and policy preferences
- Facilitating endogenous institutional change or persistence (Gandhi and Przeworski 2006, Myerson 2008, Svolik 2012)
- Implications for meaningful representation (Malesky and Schuler 2010)

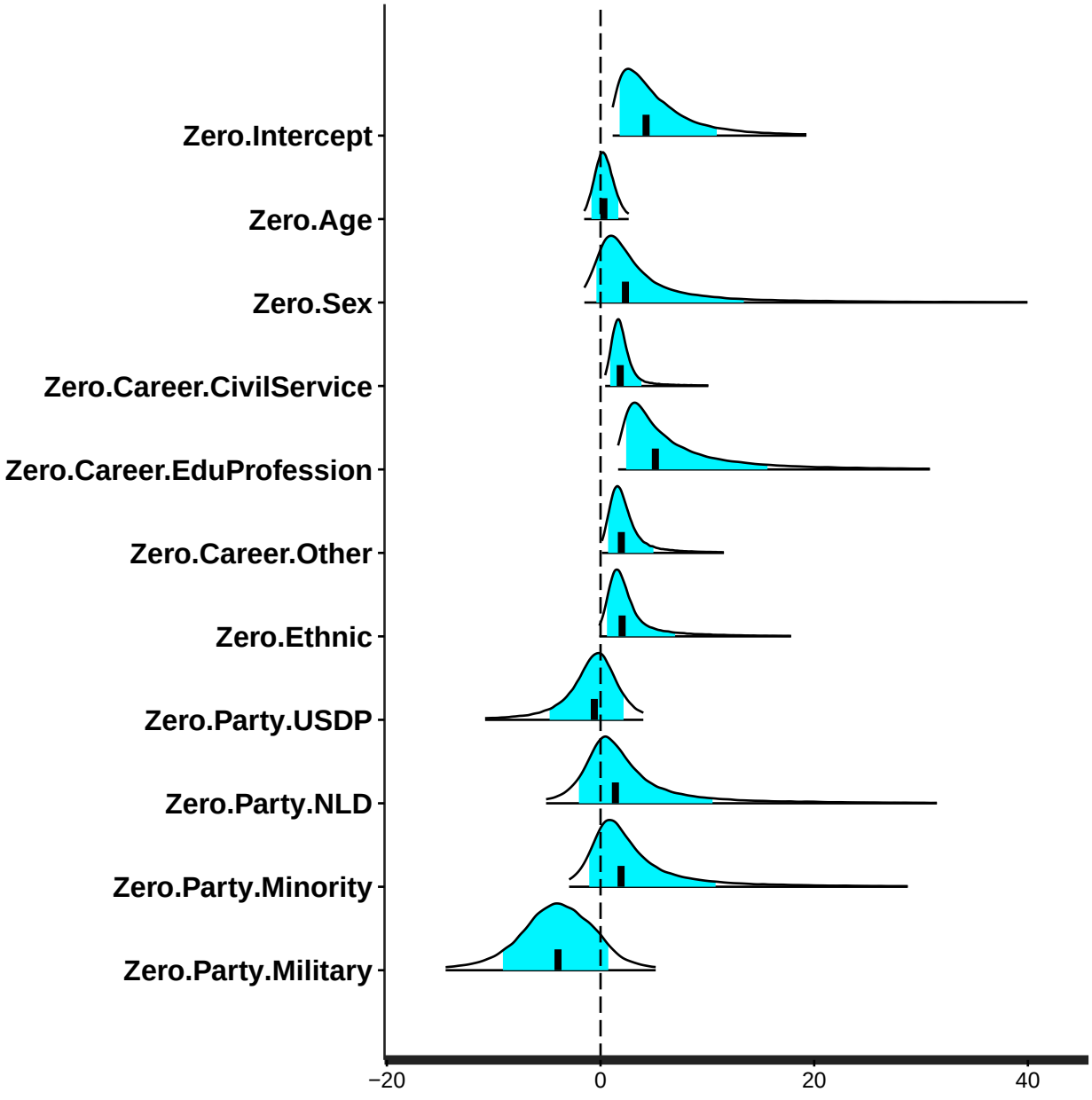
Modeling Strategy

ZINB vs. Negative Binomial in Vietnam/Myanmar data:
Log DV (plus $c = .001$) shows bimodality in participation

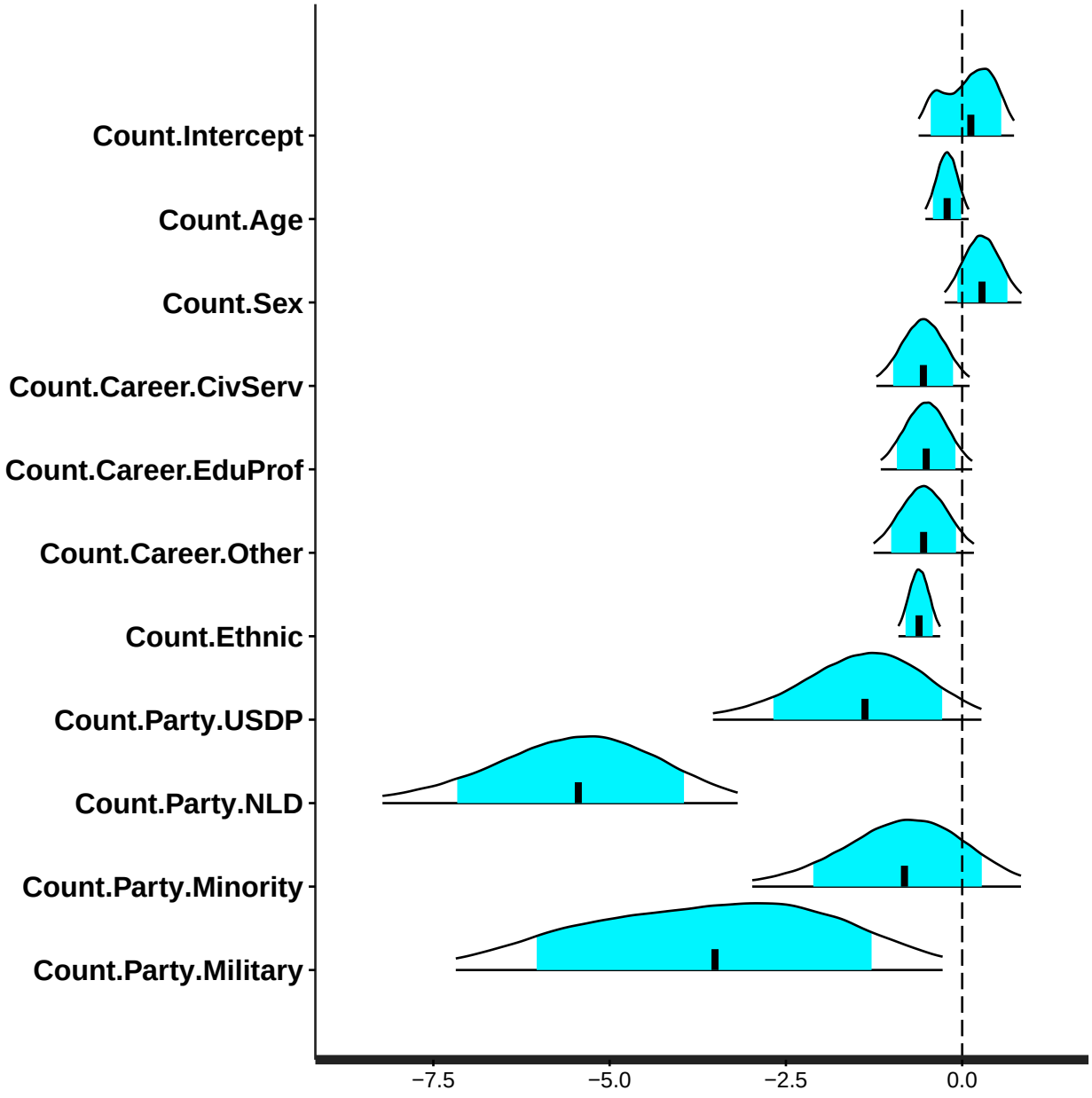


$$NumQuestions = \alpha + \beta_1 Age + \beta_2 Sex + \beta_3 Career + \beta_4 Ethnicity + \beta_5 Party + \epsilon$$

Preliminary Results

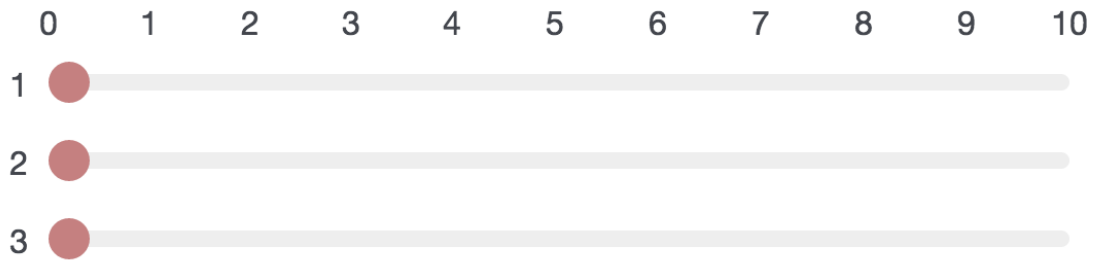


Preliminary Results 2



Eliciting Priors: Survey

A member of parliament is a member of the USDP, is Burmese, and previously served in the military. Use your "chips" to indicate how many times you think this member of parliament asked questions to a minister.



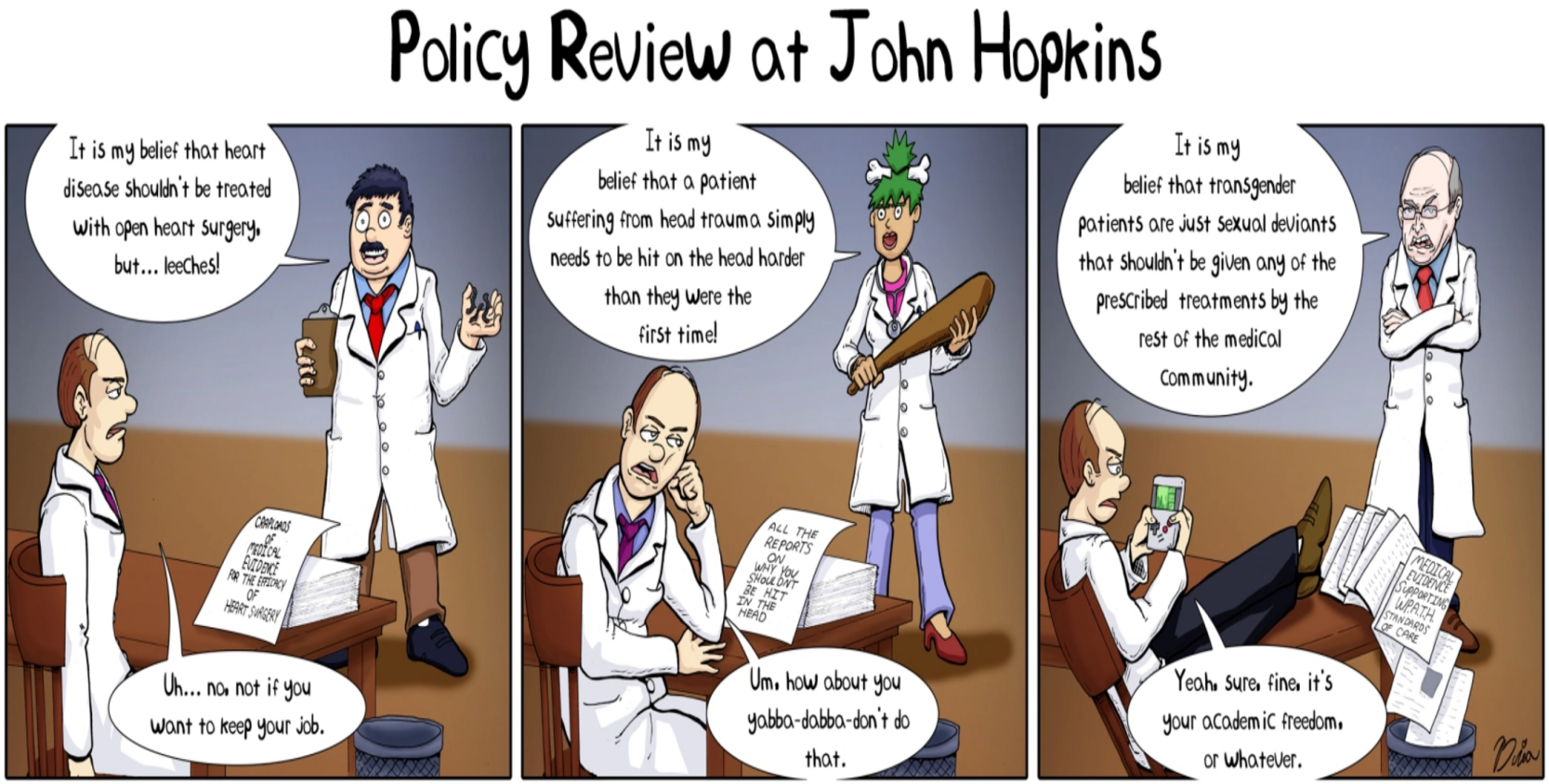
Applications

- Applications that most benefit from an elicited priors approach are those that benefit from a Bayesian approach in general:
  - Low data (authoritarian, less developed contexts)
  - High degree of variation
  - Complex model structure
- Potential to integrate qualitative and quantitative approaches
- Guidance on how best to implement an elicited priors approach is limited
- Priors play a significant role in particularly challenging modeling exercises/contexts (e.g., authoritarianism, developing countries)

Literature

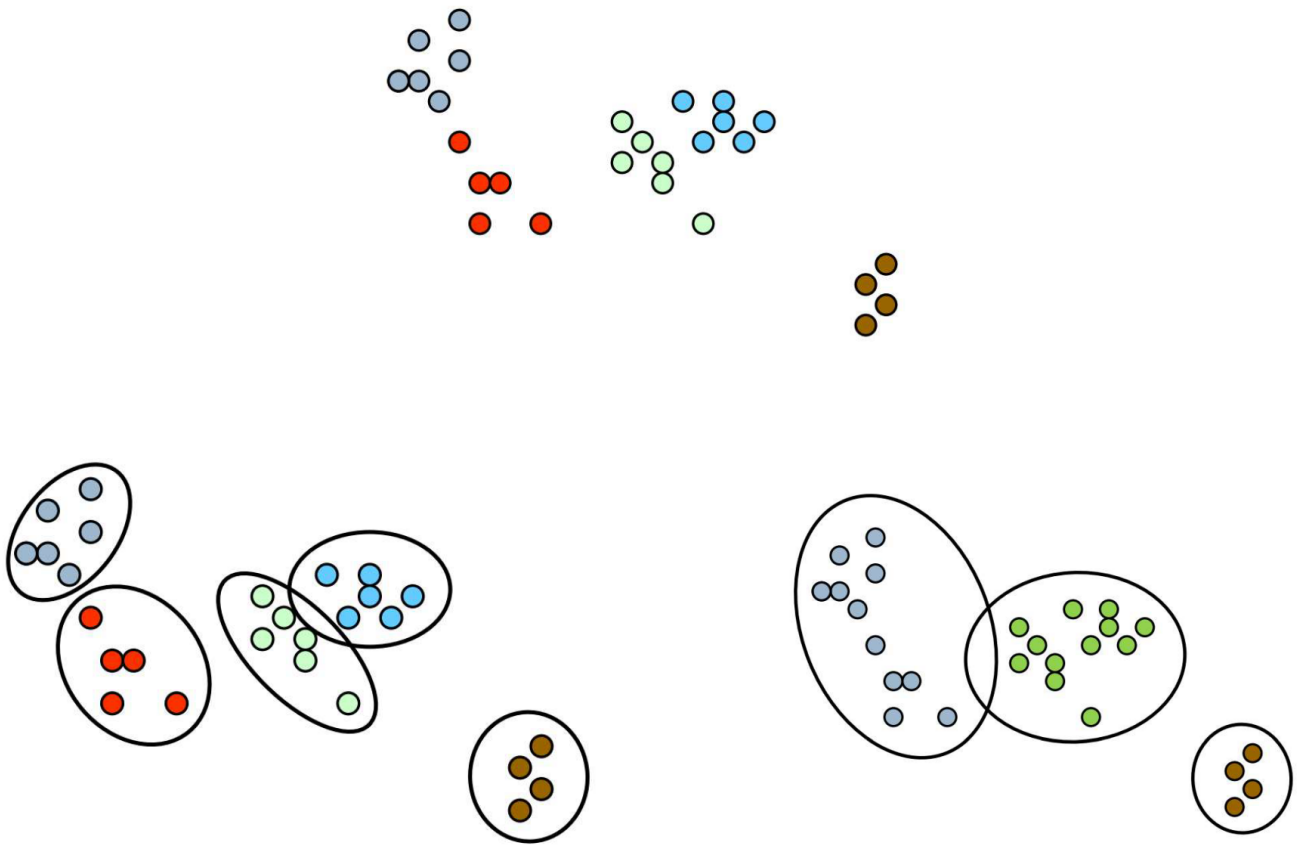
- Limited adoption in all fields, even since Gill and Walker (2005)
  - Difficult and time consuming to implement
  - General skepticism of (subjective) Bayesian approaches
- Applications in scientific fields, especially the natural and biological sciences as well as medicine, predominate
  - Circumscribed view of "expertise" in these settings
  - Commonly achieve consensus/average
  - Emphasis on the validity of individual priors with respect to the data

Yet even the "hard" sciences and medicine harbor differences of opinion...



A Dirichlet Approach

A Dirichlet-based approach allows for the integration of divergent priors without relying on averaging or consensus priors directly.



Applying Methodology

Incorporating elicited priors combined through the Dirichlet-based approach should aid in the estimation of this complex model.

$$y_i \sim F(r, count_{cluster_i} \cdot x_{z_i}, zero_{cluster_i} \cdot x_{z_i})$$

$$\pi \sim Dirichlet(\alpha)$$

$$\alpha = (\frac{m}{n}, n)$$

$$cluster_i \sim Categorical(\pi)$$

$$zero_i \sim N(\mu, \Sigma)$$

$$count_i \sim N(\mu, \Sigma)$$

Implementing Dirichlet: Simulation

Figure: Experts = 20, Questions = 10, Covariates = 10

Implementing Dirichlet: Simulation

Figure: Experts = 10, Questions = 15, Covariates = 4

Implementing Dirichlet: Simulation

Figure: Experts = 10, Questions = 10, Covariates = 4

Western and Jackman 1994

- Illustrating the application of Bayesian priors in comparative politics
- Standing debate between Stephens and Wallerstein (experts!) used to assess differing model estimates
- OLS:
  $Union \sim \alpha + LeftGovt + LogLabor + EconConcent + \epsilon$
- 20 industrialized nations, single-year snapshot

Wallerstein and Stephens' Priors

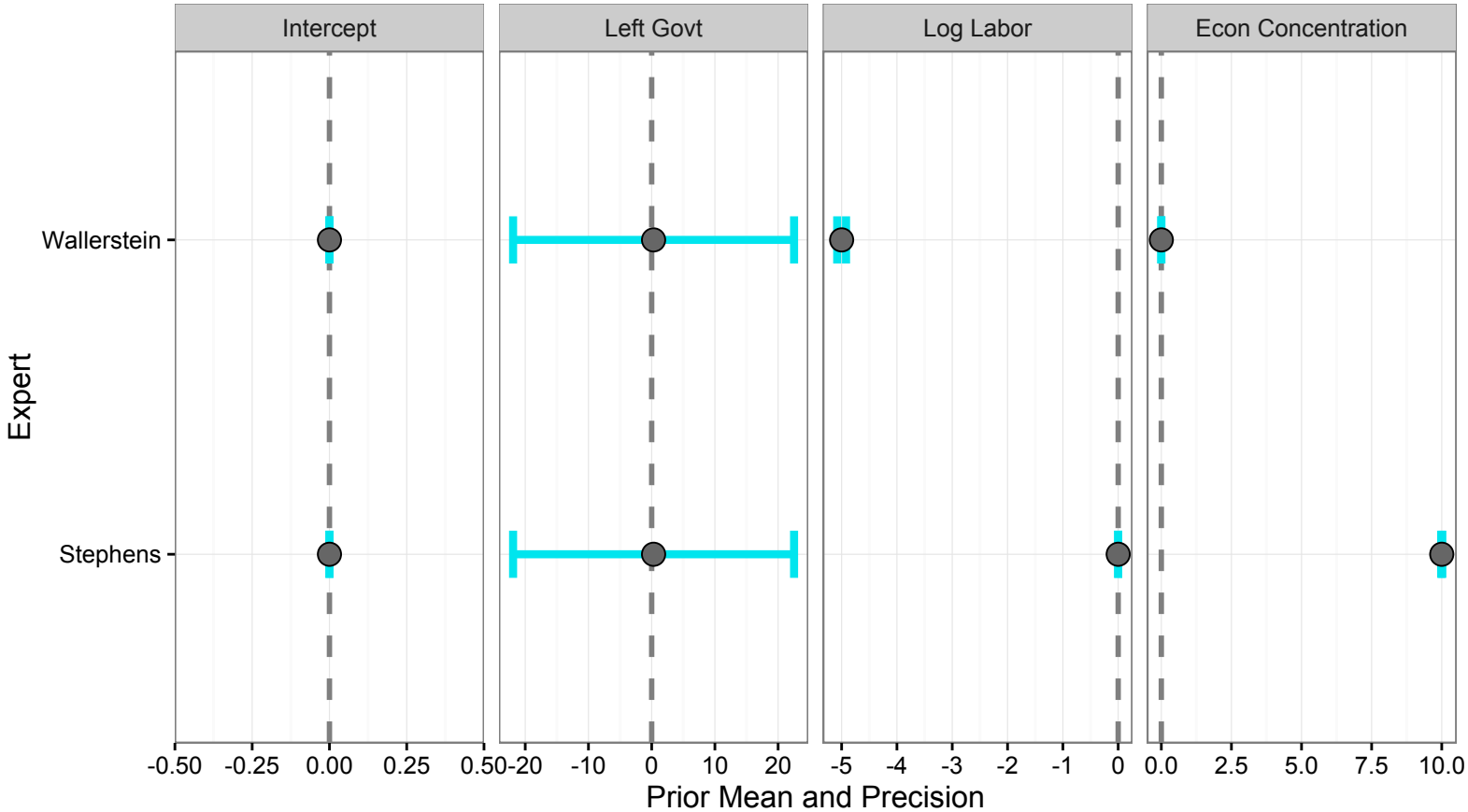


Figure: Priors in Western and Jackman (1994)

Hypothetical Expert Priors

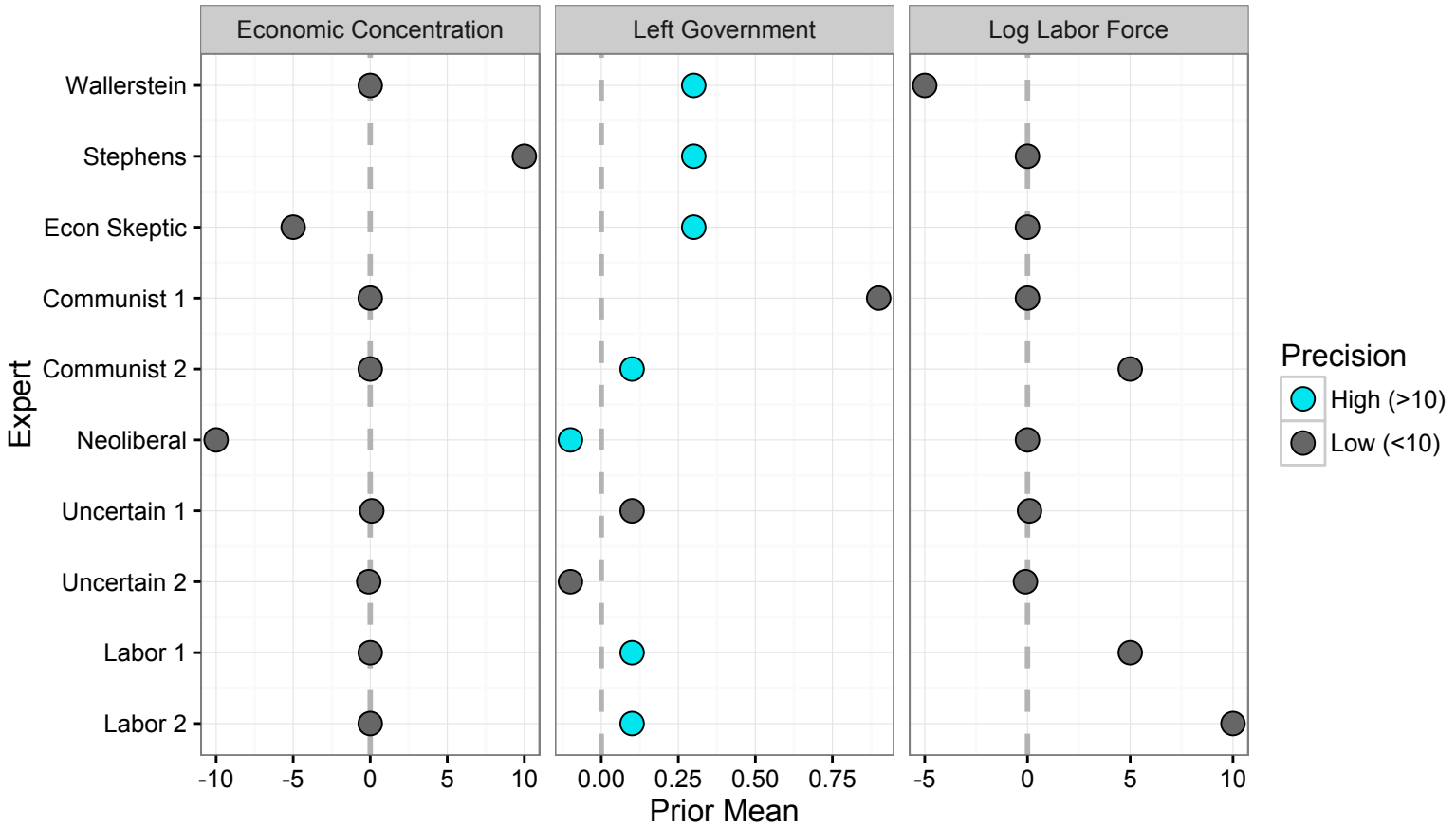


Figure: Additional Expert Priors

Comparing Dirichlet Aggregation to Averaging

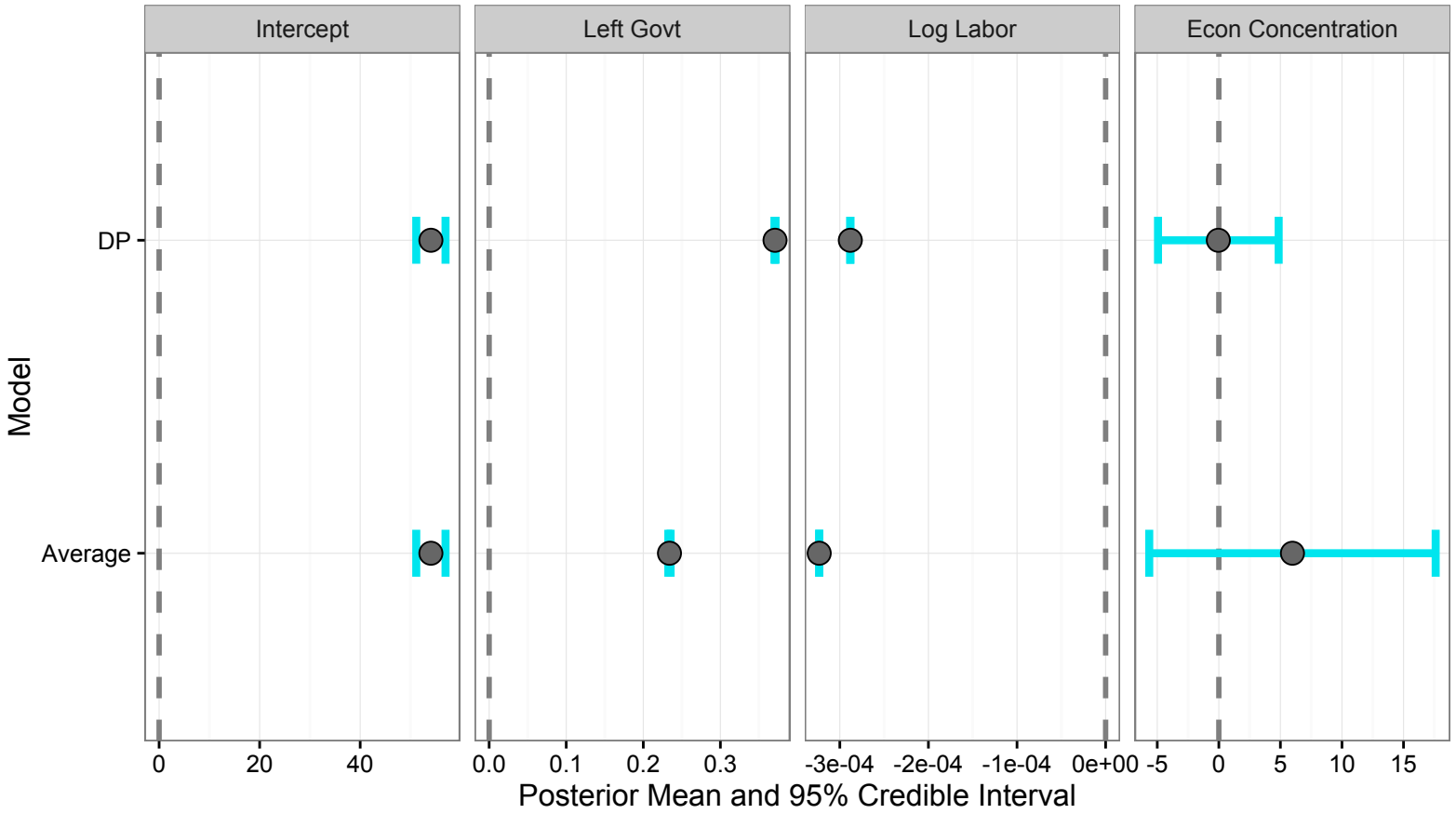


Figure: Dirichlet vs. Averaging Results

Extensions & New Directions

- Simulated priors with OLS & probit comparing Dirichlet to pooling and averaging
- Directly eliciting priors for the Myanmar case, survey (online) vs. standard
- Elicitation with American experts through online surveys (joint)
- Elicitation from "credible" print/online sources

Conclusions & Implications

- Consider "expertise" as a broader category
- Benefiting from the knowledge and experience of qualitative scholars
- Evaluating expert opinions interrelatedly rather than independently
- Treat "truth" with more complexity