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Introduction to the Special Issue

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The use of multilevel models—models in which lower-level (''micro'') units are nested within higher-level (''macro'') units—has blossomed recently in political science. Possible relationships in such models include macro variables influencing macro variables; micro variables influencing micro variables; macro variables influencing micro variables, and vice versa; and often most interestingly, micro-micro relationships varying interactively with macro variables. Most work in political science has drawn on the useful introductions of Raudenbush and Bryk (2002), Western (1998), and Steenbergen and Jones (2002). We refer readers to good general introductions/reviews of multi-level modeling in the articles in this issue by Bowers and Drake and by Franzese.

Most multilevel work over the past several years has dealt with various aspects of American politics, but recently a good deal of new multilevel work has begun to appear in studies of comparative politics—as is evidenced, among other things, by the majority of the contributions to this special issue.

It is hardly a surprise that comparative politics is gravitating to multilevel models. Probably all analysis in comparative politics involves nested variables: Do voters in presidential systems hold the incumbent government more accountable for economic performance than voters in parliamentary systems? If so, does the institutional effect vary across voters? Do relations between executive and legislature work differently in federal systems or in unitary systems? (In this case, executive and legislature are the micro units.) Even where variables are not explicitly nested, they will be implicitly so in theory, as in questions about the relationship between democracy and economic development; though these are both macro level variables, all arguments about their relationship involve assumptions about how various subsystem players (labor, capital, the military, etc.) interact under varying system-level conditions. Comparative politics, dealing as it does with how

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politics operates in varying political systems, appears by its very nature to be multilevel. Indeed, one could reasonably claim that all comparative politics is multilevel.

Recent interest in multilevel models among comparativists has its roots both in theoretic considerations and in newly available sources of data. Theories of political institutions, and how they work under varying circumstances, have led naturally to hypotheses involving nested variables. So has the chief rival of institutional analysis, cultural explanation. On the data side, directly as a response to these theoretical concerns, there have developed over the last 20 or so years rich datasets in the World Values Surveys, the Eurobarometers, and the Comparative Study of Electoral Systems that are designed for multilevel analysis of citizens, districts/regions, institutions, and polities.

The data with which comparativists often approach multilevel work are a bit unusual as compared with the multilevel data that political scientists have typically used until now. For the most part, these data are collections of surveys from a number of countries. Typically, they will consist of samples of 1000 or more citizens, from 20 to 60 countries. This offers a potential advantage, as compared with what we might call "standard" multilevel data, in that the large samples per macro unit offer us the possibility of good estimation of internal quantities of interest. Most multilevel models—hierarchic linear models, for instance—are set up to accommodate a more generic situation in which there are numerous macro units but rather small micro samples per unit. These models were originally developed for education studies in which one might have data on many classrooms but with only 20 or 30 pupils apiece. The dimensions of the "standard" data are such that standard models do not estimate internal quantities of interest individually, but rather borrow strength across units as part of the general model (see Franzese's essay in this issue for an extended discussion on this point).

A Two-Step Alternative

An alternative that is explored in a number of the articles in this issue is a so-called two-step strategy: First, one estimates the micro level parameter of interest for each of the macro units, taking advantage of the fact that the micro level n's are sufficient for good estimation of the parameters and their standard errors. Then we relate the estimated parameters to macro level variables across the set of macro units. For instance, one might estimate the effect of party identification on vote for each of a number of countries, and then as a second step relate the coefficients of those regressions to variation in the countries' electoral systems.

The potential advantages of working with direct estimates within units, however, can also come at a potential cost in efficiency. If only some of the data are incorporated into the estimation procedure, that would be expected to lead to a loss of efficiency, as compared to estimating a single model embracing both micro and macro levels. This question is related to an additional difference between comparative data and standard multilevel data. Borrowing strength across students in adjacent classrooms might seem more intuitive than borrowing strength across, say, Japanese, Icelandic, and Greek voters. (For extended discussion, see Achen's essay in this issue.)

The articles in this issue address two broad questions about good modeling under these circumstances. First, many of them address the question of efficiency and the cost-benefit payoff of single models versus two-step models. How much is gained with large micro samples? Are there circumstances under which there is no loss of efficiency? Second, are there flexibilities in modeling to be gained by going to a two-step strategy that may be worth modest costs in efficiency? How "modest" are those costs?

It is safe to say that a good deal of this issue is devoted to various takes on this set of questions. But a perhaps more important set of concerns has to do with strategies of theory development and of discovery. One article, for instance, explores the virtues and advantages of building a multilevel model from the ground up, from a fully specified micro level model. Others evaluate modeling strategies not just in terms of statistical efficiency, but also by how much they help the investigator to discover important relationships and processes in the data. For *Political Analysis,* this issue contains an unusually high proportion of substantive articles as compared with methodological ones. This is because it was in substantive investigations that many of the authors in the issue found their way to this concern, that then proved to be a shared one.

The general situation focused on by most of the articles in the issue—multilevel modeling in a context of a rather small number of macro units, with large numbers of micro observations per unit—may be of most immediate interest to comparative politics, although it will certainly apply to a number of situations in American politics, such as collections of state polls. But we hope that the discussions of multilevel modeling, of the nature and limits of efficiency in various single models and two-step strategies, and of strategies of theory development and of discovery will strike chords for many methodologists beyond those working with data involving these immediate concerns.

This Issue of Political Analysis

Multilevel data analysis involves multiple questions. This issue, while by no means providing an exhaustive discussion of the questions involved, touches on many of them. The issue is composed of three types of articles, plus two short commentaries. The first set of articles offers a discussion of topics related to estimation and data investigation of multilevel models. The second set of articles consists of applications of multilevel modeling in comparative politics. The third set discusses the different approaches pursued above, extends the discussion to nonlinear relationships at both the micro and macro levels, and offers general guidelines. Finally, the two commentaries discuss the articles and issues of data analysis they raise.

The first set opens with **Jake Bowers** and **Katherine Drake,** who propose an example of how one might go about exploratory data analysis (EDA) for multilevel models. While EDA in itself is, of course, not a new idea, Bowers and Drake suggest a series of steps a practitioner might want to take before fitting a multilevel model in order to examine the validity of assumptions and modeling decisions. In particular, utilizing an example of political participation in the United States, they suggest ways to display first-step coefficients and assess patterns in them.

Karen Jusko and **W. Phillips Shively** derive a two-step model. They argue for the use of the two-step approach in cases in which the samples within each macro unit are large and prove efficiency of the two-step approach under some conditions for the linear model. They illustrate the use of the two-step approach by investigating why turnout declines rather than increases with the number of parties on the ballot.

In the two-step approach used commonly in multilevel modeling but also in other types of analyses in political science, the dependent variable in the second step is not observed but is instead estimated in the first step. **Jeffrey Lewis** and **Drew Linzer** show that weighted least squares, a solution commonly used to account for heteroskedasticity induced by the variation in the sampling variance of the dependent variable, results in downwardly biased standard errors. They further analyze the extent of this bias under different conditions. The authors suggest two alternative solutions. They demonstrate the various solutions by reanalyzing the cross-national presidential data used by Cohen (2004).

The second set presents three applications, all of which make use of individual-level surveys in different polities as well as institutional (and other) polity-level data. In each of these, the survey samples within each polity are large enough to allow for a separate analysis.

John Huber, Georgia Kernell, and **Eduardo Leoni** study the effect of contextual variables (both institutional and societal) on the proclivity of individuals to form attachment to parties. They further investigate how these variables affect different individuals to different degrees. They employ a two-step design in which the first step estimates individual-level proclivity to be attached to a party, and the second step, calculating the proclivity for individuals with particular characteristics, examines how this proclivity varies by contextual conditions.

Raymond Duch and **Randy Stevenson** examine how the degree of economic voting varies with the distribution of policy-making responsibility across parties. Specifically, employing both one- and two-step estimation strategies, they explain the degree to which distribution of responsibility affects the link between voter assessment of the economy and voter endorsement of the incumbent party. They spend time exploring cross-sample models whose covariates are identical to those whose right-hand-side specifications differ.

Orit Kedar analyzes how diffusion of power in parliaments affects decision rules voters follow. She employs a two-step analysis derived from a formal model of voter choice. In the first step, both the dependent variable (party choice) and the set of covariates used to explain it vary across polities. The second step explains voter decision rule estimated in the first step using institutional measures of power dispersion.

Finally, in the third set, two articles address the approaches pursued in the core articles and offer extensions. **Robert Franzese** compares the one-step and two-step approaches. He demonstrates that the advantages and disadvantages of either approach depend on the dimensions and nature of the data and the researcher's goal. In his discussion, he touches on issues such as efficiency, cross-sample information, idiosyncratic versus systematic effects, and causal heterogeneity. Finally, he draws a link between the "typical" micro-macro multilevel data and another type of multilevel data, time-series-cross sectional data.

Christopher Achen discusses the two-step approach and the properties of its estimates when both stages are nonlinear. He then provides guideposts for two-step analysis when the first step is nonlinear and its estimates are known to be consistent but not necessarily unbiased.

Two authors conclude with commentaries about multilevel modeling in general, and about the papers in this issue in particular. **Neal Beck** encourages practitioners to incorporate the macro level variables into the analysis and conduct it all in one step to achieve efficiency. Two-step analysis, he argues, might be useful only as an intermediate step. **Andrew Gelman** offers suggestions about graphic presentation in a context of his broader concern for the usefulness, clarity, and richness of models. He focuses more on the craft of modeling and less on estimation technique.

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